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GREEN JOBS AND RED TAPE: ASSESSING FEDERAL EFFORTS TO ENCOURAGE EMPLOYMENT

HEARING

BEFORE THE

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

WEDNESDAY, APRIL 13, 2011

Serial No. 112–14

Printed for the use of the Committee on Science, Space, and Technology

Available via the World Wide Web: http://science.house.gov

U.S. GOVERNMENT PRINTING OFFICE
65–701PDF WASHINGTON : 2011

For sale by the Superintendent of Documents, U.S. Government Printing Office
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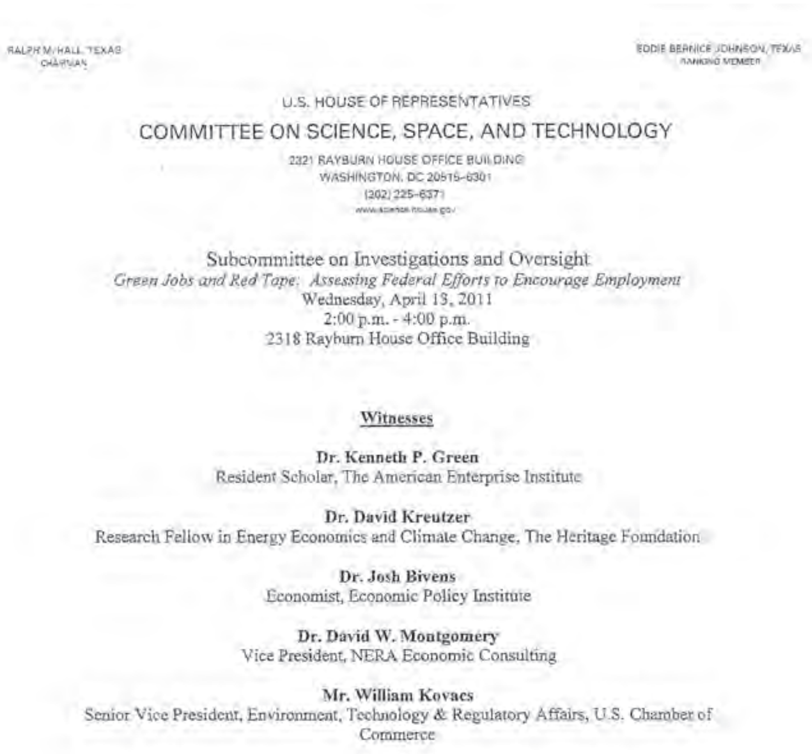
GREEN JOBS AND RED TAPE: ASSESSING FEDERAL EFFORTS TO ENCOURAGE EMPLOYMENT

WEDNESDAY, APRIL 13, 2011

House of Representatives,
Subcommittee on Investigations and Oversight,
Committee on Science, Space, and Technology,
Washington, DC.

The Subcommittee met, pursuant to call, at 2:05 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Paul Broun [Chairman of the Subcommittee] presiding.



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Subcommittee on Investigations and Oversight
Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment
Wednesday, April 13, 2011
2:00 p.m. - 4:00 p.m.
2318 Rayburn House Office Building

Witnesses

Dr. Kenneth P. Green
Resident Scholar, The American Enterprise Institute

Dr. David Kreutzer
Research Fellow in Energy Economics and Climate Change, The Heritage Foundation

Dr. Josh Bivens
Economist, Economic Policy Institute

Dr. David W. Montgomery
Vice President, NERA Economic Consulting

Mr. William Kovacs
Senior Vice President, Environment, Technology & Regulatory Affairs, U.S. Chamber of Commerce

HEARING CHARTER

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
U.S. HOUSE OF REPRESENTATIVES

Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment

WEDNESDAY, APRIL 13, 2011
2:00 P.M.—4:00 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

Purpose

The Subcommittee on Investigations and Oversight meets on April 13, 2011 to examine the issue of green jobs and efforts to create them. The term "green jobs" generally refers to employment in the alternative energy and energy efficiency industries. One of the primary goals of the recent growth in federal incentives and funding for alternative energy sources and energy efficiency industries has been the creation of green jobs.

The hearing will examine international efforts to create green jobs, as well as historical efforts domestically, including the American Recovery and Reinvestment Act. In light of the Administration's recently announced "Winning the Future" initiative, the Subcommittee will explore the effectiveness of loan guarantees, subsidies, tax incentives, regulations, mandates, research, and other federal efforts to create green jobs. Under House Rules, the Committee has jurisdiction over all energy research, development, and demonstration projects; all environmental research and development; as well as the commercial development of energy technologies.

Background

Pre-2009 Incentives

Prior to enactment of the American Recovery and Reinvestment Act of 2009 (ARRA), the federal government provided a series of tax incentives for users and producers of green energy. These incentives were continued, and in many cases, expanded with the enactment of ARRA. These pre-existing incentives included tax credits for:

- Biofuel production
- Solar and fuel cell investments
- Energy efficient appliances
- Energy efficient commercial buildings
- Energy efficient new homes
- Renewable energy production
- Residential solar and fuel cell installation
- A range of tax credits for alternative fuel automobile technologies

In addition to tax incentives, renewable energy portfolio mandates are also a means by which the public sector attempts to create green jobs. Currently, there is no federal renewable energy portfolio mandate, but 43 states have renewable energy portfolio mandates set by their State Public Utility Commissions that require a percentage of each state's energy usage to be generated by renewable energy sources such as solar, wind, biomass and hydroelectric. For example, the state with the biggest long-term commitment, Maine, will require 40 percent of its energy to be generated by renewable sources by 2017 while the state with the lowest long-term commitment, Pennsylvania, will require only eight percent by 2020. Seven states have either non-binding targets or non-percentage goals.

Similar to mandates, regulations are often used as a method of encouraging green jobs development. By placing restrictions and limitations on certain energy sectors, governments can artificially influence the market by creating a disincentive for certain energy sources and technologies, therefore making others more financially viable. This increased demand creates jobs in a new sector, but as some argue, this comes at the detriment of employment in the regulated sector. Proponents of regulation as an incentive for job growth argue that the market is already unbalanced when it fails to adequately take into account externalities such as environmental impacts, and regulations simply force the market to account for those externalities.

Loan guarantees are yet another way the federal government attempts to bring about green jobs. Created as part of the Energy Policy Act of 2005, the program leverages federal dollars by allowing the Department of Energy to guarantee the debt of privately owned clean energy developers and manufacturing companies instead of investing directly into these companies through grants or tax subsidies.

Additional federal efforts aimed at increasing green job growth include subsidies, direct expenditures, and research and development. Subsidies and direct expenditures seek to directly affect the energy industry by providing funds to producers or consumers of energy. Federal research and development spending focuses on a variety of goals, such as increasing U.S. energy supplies, or improving the efficiency of various energy production, transformation, and end-use technologies. Research and development expenditures do not directly affect current energy production and prices, but, if successful, they could affect future production and prices.

ARRA Funding

ARRA contained over $60 billion in tax credits and grants to fund various federal, state, local, and private sector efforts related to alternative energy and energy efficiency including $21.6 billion in tax credits for renewable energy and $45.2 billion for direct appropriations. These funds were in addition to pre-existing tax incentives and federally funded research and development efforts in the same areas. ARRA funding and incentives for alternative energy and energy efficiency had several purposes:

- Research and development by public and private scientists to develop new sources of energy and to lower the cost of existing technologies
- Reductions in overall energy usage through tax incentives and grants to reward particular actions and investments
- Commercialization of alternative energy technologies
- Job creation in these sectors of the economy

ARRA tax credits expanded pre-existing incentives for renewable energy and created several new ones, resulting in more projects becoming financially feasible. ARRA direct appropriations were used for significantly more research and development, increased block grants to states for weatherization of residential properties and consumer purchases of energy efficient appliances, federal grants for advanced battery manufacturing, alternative fueled vehicles, increases in federal building energy efficiency, smart grid development, and loan guarantee programs. The vast majority of the jobs created by ARRA are believed to be in weatherization projects of residential homes.

To address concerns that new funding benefit Americans, Section 1605 of ARRA contained a "Buy American" provision that required stimulus funds to be spent only on American steel, iron, and manufactured items, subject to three exceptions for non-availability, unreasonable cost, and inconsistent with the public interest. The Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) is responsible for issuing these waivers. To date, EERE has issued 44 non-availability categorical waivers and three public interest waivers, two of which are no longer in effect. The categorical waiver items cover a range of items, from specific products such as LED lamps for television studio lights to broad categories such as all Energy Star rated in-wall air conditioners. It appears that no statistics have been collected to determine how many jobs have been created overseas as a result of these categorical waivers, some of which cover broad areas of manufacturing. In addition, large scale wind projects have turned to wind turbines in Europe and China to build American wind farms. These projects have received project waivers to allow the importation of foreign manufactured wind turbines.

FY12 Budget Proposal

This February the Administration released its "Winning the Future" initiative, as well as the "Strategy for American Innovation," and the "Startup American" campaigns. The goal of these proposals is to "bring greater income, higher quality jobs, and improved health and quality of life to all citizens." Some of the main goals outlined in these agendas include:

- The development of a Clean Energy Standard which would call for 80 percent of the nation's electricity from "clean" sources by 2035
- Increased funding for the Advanced Research Projects Agency—Energy (ARPA–E)
- The creation of three Energy Innovation Hubs
- The Reauthorization of the Clean Energy Manufacturing Tax Credit
- Funding to reach the goal of one million advanced technology vehicles on the road by 2015
- Two $1 billion initiatives for investing in early-stage seed financing and other incentives to invest in high-growth startups
- Permanent extension of the Research and Experimentation Tax Credit

Issues

Defining and Calculating Green Jobs

Jobs are typically considered "green" when they involve alternative energy or increased energy efficiency. More uncertain is how to count jobs that are somewhat related such as the truck drivers who deliver solar panels across America, the state employees who process the tax credits for energy efficient appliances, and the consultants that advise cities and states on how to improve energy efficiency. At its broadest scope, green jobs could include:

- Factory workers that manufacture solar panels, wind turbines, etc.
- Architects and engineers who design these manufactured goods
- Construction workers who increase the energy efficiency of existing homes and buildings by installing insulation, caulking doors, and installing new more efficient windows
- Factory workers who manufacture the same insulation, caulk, and windows
- Truck drivers who deliver energy efficient appliances to job sites
- Construction workers that install solar panels, wind turbines, etc.

However, many of these jobs would still exist even if they were not "green" in nature. Architects and factory workers would still be needed to design and build components for coal mines and natural gas plants. Less efficient windows still need to be manufactured by the same workers, delivered by the same truck drivers, and installed by the same construction workers. Coal miners would be as in demand as they were before, if not more so, should alternative energy projects not be subsidized to the extent they are today.

Energy Savings

A great deal of uncertainty surrounds the energy savings resulting from the ARRA funding. Initially, ARRA grant applicants were required to estimate the energy savings that would result from their proposed projects. However, the Department of Energy's Office of Inspector General found that original estimates for the energy savings due to ARRA projects were wildly overestimated:

For example, the sum of the state's estimates for anticipated energy savings was 88 billion MBtus based on their initial proposed SEP projects. However, our review of this estimate found that it contained a number of errors and inconsistencies. Management agreed, pointing out that the estimate was not realistic or achievable since the United States' total energy consumption is estimated at 100 billion MBtus.

The Department is no longer collecting energy savings estimates.

Regulatory Impediments and Underutilized Authority

The creation of jobs that also benefit the environment is a goal shared by many. Unfortunately, the ability to create green jobs can be stymied by regulatory and legal challenges. For example, a wind energy project proposed to be located off Cape Cod called Cape Wind originally filed for its permits in 2001 and has repeatedly faced legal challenges from those opposed to the location of wind turbines offshore. Finally in January 2011, the Army Corps of Engineers issued one of the last permits required for construction to proceed.

Other projects related to green energy such as the construction of Midwestern transmission lines to deliver wind power to large cities have also faced strong opposition. The U.S. Chamber issued a report in March 2011 entitled, Project No Project, highlighting permitting problems and legal challenges faced by energy projects nationwide.

In addition to regulatory hurdles, a number of existing authorities relating to green jobs are underutilized. U.S. government agencies have the authority to enter into energy savings performance contracts (ESPCs) under which private sector entities pay to improve the energy efficiency of federal buildings in return for keeping the savings to pay for their investments with some profit. ESPCs require minimal federal funding and shift the costs of upgrading energy efficiency in federal buildings to the private sector.

Additional Issues

Additional questions relative to green jobs include the following.

- Do incentives actually produce a net increase in jobs?
- Are they an efficient way to increase jobs?
- Are jobs the correct economic output the country should be measuring?
- On a job-for-job basis, should green jobs be subsidized more than non-green jobs?
- Could the same amount of money spent on creating green jobs be more effective in creating jobs in other "non-green" industries?
- Could federal funds spent on renewable projects have a greater employment and environmental impact if the same funds were spent on other energy projects?
- Will these newly created jobs be permanent or will they remain in existence only until subsidies for them expire?
- Are these jobs created domestically, or overseas?
- Can these international jobs statistics be accurately tracked?
- Are we borrowing money to create these investments and create these jobs?
- Where are we borrowing this money from?
- Are we funding foreign companies?
- Are domestic companies doing this work overseas?
- Have U.S. subsidies and incentives helped foreign countries expand their own industries to the detriment of the U.S.?
- How does the growth of foreign green industries impact the U.S.?
- What metrics should decide whether federal funding related to green jobs is successful and a wise use of scarce federal funds?
- Should federal funding be shifted more towards basic research and development?

Witnesses

- Dr. Kenneth P. Green, Resident Scholar, The American Enterprise Institute
- Dr. David Kreutzer, Research Fellow in Energy Economics and Climate Change, The Heritage Foundation
- Dr. Josh Bivens, Economist, Economic Policy Institute
- Dr. David W. Montgomery, Vice President, NERA Economic Consulting
- Mr. William Kovacs, Director of Environment, Technology & Regulatory Affairs Division, U.S. Chamber of Commerce

Chairman BROUN. The Subcommittee on Investigations and Oversight will come to order. Good afternoon. Welcome to today's hearing entitled, "Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment." You will find in front of you packets containing our witnesses' panel written testimony, biographies, and truth in testimony disclosures.

I recognize myself now for five minutes for an opening statement. The economic crisis of 2008, provided a new Administration with the opportunity to expand government's role in a number of different areas. One of the most prominent was the energy sector.

This expansion was meant to be, "timely targeted and temporary," yet spending is still ongoing today. One of the highlights of the Stimulus Bill's energy agenda was the goal of creating green jobs that would spur employment, aid the environment, make us most secure, and keep us competitive.

With the President's 2012, budget, the President is asking Congress to double down on that strategy. The Start-up America Campaign, the Clean Energy Initiative, and the Strategy for American Innovation extends and expands many of the same initiatives put forth in the Stimulus Bill.

In the course of reviewing the President's FY '12, budget, the Science, Space, and Technology Committee heard from a number of agency officials about the importance of maintaining and expanding these green economy investments. This hearing is the first opportunity to hear perspectives from outside entities.

It is important to realize the context that we are assessing these proposals. When the President took office, the average price of gasoline was $1.84 a gallon. Today the average price is around $3.79 a gallon. This should come as no surprise. In 2008, before he became the Secretary of Energy, Dr. Stephen Chu, stated, "Somehow we have to figure out how to boost the price of gasoline to the levels in Europe." Gasoline in Europe is roughly $8 a gallon.

In a 2008, interview with the San Francisco Chronicle, President Obama, then candidate Obama, stated that, "Under my plan of a cap and trade system, electricity rates would necessarily skyrocket." Necessarily skyrocket. That is what he wants to do.

It seems as though this Administration's energy and green jobs agenda are both built less upon stimulating our economy and creating domestic jobs and more on picking winners and losers and financing foreign investment and production.

On one hand, the Administration is limiting development of oil production in the outer continental shelf. On the other hand it is promoting the development of oil off the coast of Brazil. On a recent trip to Brazil President Obama stated Americans, "want to help with technology and support to develop these oil reserves safely, and when you are ready to start selling, we want to be one of your best customers."

On one hand the President advocates for federal investments and green technologies as an economic stimulus and jobs creator. On the other hand U.S. taxpayer dollars are purchasing renewable energy equipment manufactured in Europe and in Asia.

A 2010 report by the Investigative Reporting Workshop found that more than $1.6 billion in Stimulus funds were used to buy foreign-manufactured products. If the goal is to create jobs here in

America, I am not sure that this is the right method. It seems to me that the left hand does not know what the far left hand is doing.

There are a number of important policies that will ensure economic prosperity here in the United States. A competitive tax policy that maintains and entices corporate activity, a legal system that respects contracts and patents, thereby rewarding innovation, a stable regulatory environment that both protects public health and safety and encourages economic activity, and a highly-educated and trained workforce capable of meeting 21st century challenges are all imperative to prosperity.

Unfortunately, we find ourselves with the highest corporate tax rate in the developed world, an Administration that stated it seeks to, "share all intellectual property as much as possible," and an ever-expanding regulatory system strangling small businesses and killing jobs.

Today we will hear from outside experts on what role government incentives such as loan guarantees, subsidies, tax incentives, mandates, R&D, and regulations can or should play in augmenting these principles.

[The prepared statement of Mr. Broun follows:]

PREPARED STATEMENT OF CHAIRMAN PAUL BROUN

The economic crisis of 2008 provided a new Administration with the opportunity to expand government's role in a number of different areas—one of the most prominent was the energy sector. This expansion was meant to be "timely, targeted, and temporary," yet spending is still ongoing today. One of the highlights of the stimulus bill's energy agenda was the goal of creating green jobs that would spur employment, aid the environment, make us more secure, and keep us competitive.

With the President's FY12 budget, the President is asking Congress to double down on that strategy. The Startup America Campaign, the Clean Energy Initiative, and the Strategy for American Innovation extends and expands many of the same initiatives put forth in the stimulus bill. In the course of reviewing the President's FY 12 budget, the Science, Space, and Technology Committee heard from a number of agency officials about the importance of maintaining and expanding these green economy investments. This hearing is the first opportunity to hear perspectives from outside entities.

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On one hand, the Administration is limiting development of oil production in the Outer Continental Shelf. On the other hand, it is promoting the development of oil off the coast of Brazil. On a recent trip to Brazil, President Obama stated Americans "want to help with technology and support to develop these oil reserves safely, and when you are ready to start selling, we want to be one of your best customers."

On one hand, the President advocates for federal investments in green technologies as an economic stimulus and jobs creator. On the other hand, U.S. taxpayer dollars are purchasing renewable energy equipment manufactured in Europe and Asia. A 2010 report by the Investigative Reporting Workshop found that more than $1.6 billion in stimulus funds were used to buy foreign manufactured products. If the goal is to create jobs here in America, I'm not sure that this is the right method.

There are a number of important policies that will ensure economic prosperity here in the U.S.A competitive tax policy that maintains and entices corporate activity, a legal system that respects contracts and patents thereby rewarding innovation, a stable regulatory environment that both protects public health and safety and encourages economic activity, and a highly educated and trained workforce capable of meeting 21st century challenges are all imperative to prosperity. Unfortunately, we fmd ourselves with the highest corporate tax rate in the developed world, an Administration that stated it seeks to "share all intellectual property as much as possible," and an ever expanding regulatory system strangling small business and killing jobs.

Today we will hear from outside experts on what role government incentives such as loan guarantees, subsidies, tax incentives, mandates, R&D, and regulations can or should play in augmenting these principles.

Chairman BROUN. Now the chair recognizes my Ranking Member, Ms. Edwards, for an opening statement. Ms. Edwards, you are recognized for five minutes.

Ms. EDWARDS. Thank you, Mr. Chairman, and thank you to our witnesses today.

Interesting hearing that we have. The idea that government cannot make public investment choices that benefit the country actually flies in the face of our Nation's actual history. Canals, railways, roads, ports, highways, airports, the electrical grid, and the Internet are all products of government activities. The government has used different tools at different times to encourage these investments, but all of it was accomplished through government initiative.

Building our current infrastructure created jobs and established the base for a national economy that has been among the most creative and productive in the world. As we see new competitors rise around the world and as we face new environmental challenges and energy supply issues, we need to make sure we step up and prove that we are just as innovative and dynamic as the Americans who came before us.

The collapse of the housing market bubble in 2008, brought the country to the edge of an economic disaster with high unemployment and drying up of capital for businesses to meet their day-today expenses, much less look for opportunities to expand. And while we like to think that the normal, that normal economic times find consumer demand the bedrock of our economic prosperity, in the months after September, 2008, the times were hardly normal. Consumers reeled from collapsing value in their homes and investments, high unemployment left even those with a job feeling deeply insecure about their financial future, and when faced with these real conditions, it would be foolish to think that consumer demand alone was going to pull the economy out of a nosedive of what could have been a full-blown depression.

The American Recovery and Reinvestment Act or Recovery Act was adopted by Congress and signed into law by President Obama with the twin goals of getting America back to work and funding projects that would create a more modern, robust infrastructure, 21st century infrastructure, to support economic growth for future generations.

The fact that the infrastructure could also reduce our dependence on imported oil and help reduce our carbon emissions, producing a cleaner environment and fighting global climate change was actually an added social benefit, and despite the investments of the Recovery Act, much still remains to be done. We are no longer officially out of the—we are officially out of the recession, but we need to create almost 14 million jobs in order to get Americans back to work.

I believe that we have to make sustained commitment to public investment in our infrastructure and our research enterprise, and in supporting innovation. I don't believe that government is incapable of choosing wisely about public investments, and I do not believe that the government has no effective role in the face of high unemployment. Congress can't just sit on its hands while people are losing their jobs, their security, their homes, and their future. The government has many tools at its disposal to help.

I am particularly interested in seeing the research and development tax credit made permanent and to increasing the domestic production activities deduction for property manufactured in the United States, which was the result of research and development done here. In fact, I have introduced along with my colleague from Maryland and colleague on the full committee, Roscoe Bartlett, H.R. 689, the 21st Century Reinvestment Act, that would do just that.

The Information, Technology, and Innovation Foundation issued a report in 2006, that found that the U.S. had gone from offering the most generous research and development tax credit, that we had dropped to number 17 by 2004. An effective way to get people back to productive work and to reward innovation is to reward companies that innovate and create jobs here in America domestically.

I look forward to the testimony of our witnesses as we explore these issues today, less investigation and oversight and much more in exploration.

Thank you, Mr. Chairman.

[The prepared statement of Ms. Edwards follows:]

PREPARED STATEMENT OF RANKING MEMBER DONNA EDWARDS

The idea that the government cannot make public investment choices that benefit the country flies in the face of our nation's actual history. Canals, railways, roads, ports, highways, airports, the electrical grid and the internet are all the product of government activities.

The government has used different tools at different times to encourage these investments, but all of it was accomplished through government initiative.

Building our current infrastructure created jobs and established the base for a national economy that has been among the most creative and productive in the world.

As we see new competitors rising around the world, and as we face new environmental challenges and energy supply issues, we need to make sure we step up and prove that we are just as innovative and as dynamic as the Americans that came before us.

The collapse of the housing market bubble in 2008 brought the country to the edge of economic disaster with high unemployment and a drying up of capital for businesses to meet their day-to-day expenses, much less look for opportunities to expand.

While we like to think that normal economic times find consumer demand the bedrock of our economic prosperity, in the months after September, 2008, the times were hardly normal. Consumers reeled from collapsing value in their homes and investments. High unemployment left even those with a job insecure about their financial future.

Faced with these real conditions, it would be foolish to think that consumer demand was going to pull the economy out of the nose dive of what could have become a full-blown depression.

The American Recovery and Reinvestment Act (ARRA) was adopted by Congress and signed into law by the President with the twin goals of getting American's back to work and funding projects that would create a more modern, robust infrastructure to support economic growth for future generations.

The fact that the infrastructure could also reduce our dependence on imported oil and help reduce our carbon emissions producing a cleaner environment and fighting global climate change was an added social benefit.

Despite the investments of ARRA, much remains to be done. While we are no longer officially in a recession, we need to create almost 14 million jobs to get all Americans back to work.

I believe that we need to make a sustained commitment to public investment in our infrastructure, in our research enterprise and in supporting innovation. I do not believe that the government is incapable of choosing wisely about public investments. I do not believe that the government has no effective role in the face of high unemployment. Congress cannot just sit on its hands while people are losing their jobs, their security, their homes and their future.

The government has many tools at its disposal to help. I am particularly interested in seeing the R&D tax credit made permanent and increase the domestic production activities deduction for property manufactured in the U.S. which was the result of R&D done here. With bipartisan support, I have introduced a bill, H.R. 689, that would accomplish all this.

The Information Technology and Innovation Foundation issued a report in 2006 that found the U.S. had gone from offering the most generous R&D tax credit, we had dropped to number 17 by 2004. An effective way to get people back to productive work, and to reward innovation, is to reward companies that innovate and create jobs in America.

I look forward to the testimony of our witnesses.

Chairman BROUN. Thank you, Ms. Edwards. If there are members who wish to submit additional opening statements, your statements will be added to the record at this point.

At this time I would like to introduce our panel of witnesses. Dr. Kenneth Green is a Resident Scholar at the American Enterprise Institute. Dr. David Kreutzer, is that correct? Kreutzer. Okay. I can't spell, and I can't pronounce my name. It is Broun spelled with a U, but anyway, Doctor, I apologize. Dr. Kreutzer is the Research Fellow in Energy, Economics, and Climate Change at the Heritage Foundation. Dr. Josh Bivens is an Economist with the Economic Policy Institute. Dr. David Montgomery is a Senior Vice President at NERA Economic Consulting, and Mr. William Kovacs is a Senior Vice President for Environment, Technology, and Regulatory Affairs at the U.S. Chamber of Commerce.

I welcome all of you all here today and appreciate you all coming and participating. As our witnesses should know, spoken testimony is limited to five minutes each, so, please, we are facing some votes here shortly, so if—we want to try to get through this and not be here all afternoon. If you all would try to limit your spoken testimony to five minutes or less. Your full written testimony will be put in the record. And then each committee member will have five minutes to ask questions.

It is the practice of the Subcommittee on Investigations and Oversight to receive testimony under oath. Do any of you have any objections to taking an oath?

[No audible response.]

Chairman BROUN. Dr. Montgomery, I don't see—okay. Let the record reflect that all witnesses are willing to take an oath by shaking their head that they had no objections to doing so.

You also may be represented by counsel. Do you, any of you have counsel with you here today?

[No audible response.]

Chairman BROUN. Okay. Let the record reflect that all witnesses indicated they have no counsel. Now, if all of you would please stand and raise your right hand.

[Witnesses sworn.]

Chairman BROUN. Thank you very much, gentlemen. Let the record reflect that all the witnesses participating have taken the oath.

Now I recognize our first witness, Dr. Kenneth Green, of the American Enterprise Institute. You are recognized for five minutes. Dr. Green.

STATEMENT OF DR. KENNETH GREEN, RESIDENT SCHOLAR AT THE AMERICAN ENTERPRISE INSTITUTE

Mr. GREEN. Thank you, Chairman Broun, Ranking Member Edwards, members of the subcommittee, for having me here today. At the end of my testimony I have appended a pertinent study that I recently completed for AEI titled, "The Myth of Green Energy Jobs: The European Experience." Much of my testimony is derived from that paper.

My testimony represents my personal views only, and should not be construed as the official position of AEI or any other person or organization.

The question of green job creation is simply a variant on the general question of whether or not government creates jobs by intervening in the marketplace. The question has been debated since at least the 1850s, when Frederic Bastiat, a French journalist and politician, wrote, "What is Seen and What is Not Seen," an essay that should be mandatory reading for anyone interested in public policy.

Bastiat framed the idea of government creation in the broken windows fallacy. As he explained, imagine some shopkeepers have their windows broken by a boy throwing rocks. At first, everyone is horrified, and they blame the boy. But then someone points out that, well, it is not really all that bad because now jobs have been created for the window makers, the glass blowers, glaziers. And so really there was no loss because you have new jobs in making windows.

But, of course, did the child do a public good by breaking the window, the baker's window, and making a job for the glaziers? And the answer is, no, because beforehand the baker would have used his money perhaps to expand his bakery, put on a coffee shop, hire a new baker, and instead he used the money to replace a perfectly good window. So the village as a whole has lost the value of the window and has not gained any new jobs as a result.

So let's look at—the analogy holds just as well when the government breaks jobs in one sector, breaks windows in one sector of the economy and uses the money it takes from there to create jobs elsewhere.

When they pick product A over product B, what is seen is the new sales of product A. What is not seen are the loss of sales of product B and the associated job losses.

So to look at our possible green future, let's look at what happened in Europe recently where they have been very aggressive in pushing for green energy on the premise that it will create green jobs, green technologies, and green economy.

I will start with Spain.

In March of 2009, researchers at the Universidad Rey Juan Carlos released a study examining what happened in Spain as a result of their push into green energy. The study calculates that from 2000 to 2009, it cost them $815,000 each to create a green job, rising to $1.5 million to create a green job in the wind industry.

And they calculate that for every job created in the green energy industry, 2.2 jobs were destroyed elsewhere in the general economy.

Now to Italy, where a study performed by the Bruno Leoni Institute, found an even worse experience. They found that because green jobs were so expensive to create in Italy, that for every green job created in the green energy sector, five to seven jobs could have been created in the general economy for the same amount of money.

They also found that the majority of these green jobs were temporary, following through on existing plans they calculated for 2020, would create, indeed, create quite a few jobs, up to 112,000, but 60 percent of them would be temporary.

Now, the United Kingdom. A recent report by the consultancy Verso Economics found that for every job created in the United Kingdom in renewable energy, 3.7 jobs were lost in the general economy. What is interesting about that particular study is it uses a methodology that the Scottish government itself uses to calculate job losses as a result of taxes, of taxation. It uses a model that the other studies I mentioned were criticized for not using and yet it comes up with the same result as the other two studies.

Before I conclude, I was asked to comment a bit about the American Recovery and Reinvestment Act of 2009, and its effectiveness in creating green jobs. A news article in 2010, September, pointed out that only 20 billion of the 92 billion allocated for renewable energy projects had been spent, and according to the Department of Energy, as was mentioned earlier, much of that was spent abroad, creating green jobs in China, Spain, and South Korea.

For example, a report by the American University found that 11 U.S. wind farms used their Stimulus grants to buy wind turbines made abroad, 695 out of about 1,000 wind turbines purchased with Stimulus grants were made elsewhere. The Department of Energy reports that for some green stimulus projects, 80 percent of the spending was abroad.

So given that most of the green stimulus is unspent and much of what has been spent has been spent elsewhere, it is hard to see how it had a significant impact on creating green jobs here in the United States. And don’t take only my word for it, April 11, 2011, the EPA put out an at-a-glance form, and this report says that they are unable to determine what the results were of their Stimulus spending, whether it created any jobs at all because while they can track having spent the money, they could not figure out what was done with it. So it is unlikely that we have seen an explosion of green jobs.

In conclusion, the idea that government can create jobs on net in the economy is a myth, and painting the myth green doesn’t make it any less of a myth. The experience of Europe, which has preceded us in the quest for a new economy, is uniformly negative and is proving unsustainable, with subsidies being cut back and feed-in tariffs reduced.

And, not to discount American exceptionalism and ingenuity, there is absolutely no reason to believe that things would happen differently here. Green energy requires significant subsidization. By definition, that means that jobs in the wind and solar industry will be more expensive to create than those in the general economy and that means less jobs on net.

I thank you for the opportunity to testify, and I look forward to your questions.

[The prepared statement of Mr. Green follows:]

PREPARED STATEMENT OF DR. KENNETH GREEN, RESIDENT SCHOLAR, THE AMERICAN ENTERPRISE INSTITUTE

American Enterprise Institute
for Public Policy Research

Statement before the Committee on Science, Space, and Technology
Subcommittee on Investigations and Oversight

The Green Jobs Myth

Dr. Kenneth P. Green

Resident Scholar

American Enterprise Institute

April 7, 2011

The views expressed in this testimony are those of the author alone and do not necessarily represent those of the American Enterprise Institute.

Chairman Broun, Ranking Member Edwards, Members of the Subcommittee:

Thank you for inviting me to testify today. At the end of my testimony I have appended a pertinent study that I recently completed, titled "The Myth of Green Energy Jobs: The European Experience." Much of my testimony is excerpted from this study.

My testimony represents my personal views only, and should not be construed as the official position any other persons or organizations I may affiliate with.

The question of green job creation is simply a variant on the general question of whether or not government can create jobs. That question has been debated since at least the 1850s, when Frédéric Bastiat, a French journalist and politician wrote *What is Seen, and What is Not Seen,* an essay that should be mandatory reading for anyone interested in public policy.

Bastiat framed the idea that government creates jobs as a fallacy of the broken window. As Bastiat explained, imagine some shopkeepers get their windows broken by a rock-throwing child. At first, people sympathize with the shopkeepers, until someone suggests that the broken windows really aren't that bad. After all, they "create work" for the glazier, who might buy food, benefiting the grocer, or clothes, benefiting the tailor. If enough windows are broken, the glazier might even hire an assistant, creating a new job.

Did the child then do a public service by breaking the windows? Would it be good public policy to simply break windows at random to create jobs for window installers? No, because what's not seen in this scenario is what the shopkeepers would have done with the money that they've had to use to fix their windows. If they hadn't needed to fix the windows, the shopkeepers would have put the money to work in their shops, buying more stock from their suppliers, or perhaps adding a coffee-bar, or hiring new stock-people.

Before the child's action, the shopkeepers had the economic value of their windows and the money to hire a new assistant or buy more goods. After the child's action, the shopkeepers have their new windows but no new assistant or new goods, and society, as a whole, has lost the value of the old set of windows.

The analogy holds just as well when it is the government that comes, and by regulatory fiat "breaks the window" of one company successfully selling goods and services into a free market.

When the government establishes a regulation favoring product A over product B, what is seen is the new sales of product A, and the jobs associated with such sales.

What is not seen is the lost sales of product B, and the lost jobs that go with it.

And, since markets allocate capital more efficiently than does government, we would expect to see job losses on net. To see our possible green future, let's see how the broken windows fallacy has played out in Europe.

I'll start with Spain.

In March of 2009, researchers at the Universidad Rey Juan Carlos released a study examining the economic and employment impacts of Spain's push into green energy.

The study calculates that since 2000 Spain spent about $815,000 dollars to create each "green job", rising to $1.5 million per wind industry job.

The study calculates that the programs creating those jobs also resulted in the destruction of nearly 110,500 jobs elsewhere in the economy, or 2.2 jobs destroyed for every "green job" created.

Now to Italy, where a study performed by the Bruno Leoni Institute, found serious problems with the Italian experience. The Italian study found that because green jobs were so expensive to create, for every job created in the green sector, 5 to 7 jobs would have been created in the general economy.

They also found that the vast majority of the green jobs created were temporary: following through on existing plans to build green energy projects would indeed create jobs: between 50,000 to 112,000 by 2020. Alas, at least 60% of them would be temporary.

Next, the United Kingdom.

A recent report by consultancy Verso Economics found that for every job created in the UK in renewable energy, 3.7 jobs were foregone in the general economy. This report uses the Scottish Government's own macroeconomic model for Scotland, and calculates that promoting renewable energy in the UK has an opportunity cost of 10,000 direct jobs in 2009/10 and 1,200 jobs in Scotland.

Before I conclude, I was asked to comment about the American Recovery and Reinvestment Act of 2009, and its effectiveness in creating green jobs. A report released in September of 2010 pointed out that only $20 billion of the $92 billion allocated for renewable energy projects had been spent. And, according to the Department of Energy, much of that was spent abroad, creating green jobs in China, Spain, and South Korea.

For example, a report by American University found that 11 US wind farms used their stimulus grants to buy wind turbines made abroad: 695 out of about 1,000 wind turbines purchased with stimulus grants were made elsewhere. The Department of Energy reports that for some green stimulus projects, 80% of the spending was abroad.

So given that most of the green stimulus is unspent, and much of what has been spent has been spent elsewhere, when it comes to American job creation, it's unlikely that the Act had any positive impact.

In conclusion, the idea that the government can create jobs on net in the economy is a myth, and painting the myth green makes it no less of a myth. The experience of Europe, which has preceded us in the quest for a new green economy, is uniformly negative, and is proving unsustainable, with subsidies being cut back, and feed-in tariffs reduced.

<Figure 1 here: Composition of the Recovery Act>

Further, the tax cuts preferred by many of the Act's critics – those going to businesses – were far and away *the least effective* stimulus included in the Act. Tax cuts are less efficient job-creators (especially those not targeted to lower-income households) because they may be saved instead of spent, and because many of the business tax cuts were essentially windfalls (often retroactive) that rewarded activity that would have been done (or had actually already happened) even without the Act.

On the other hand, safety net programs—such as unemployment insurance, nutrition assistance, and health insurance supports– are by definition well-targeted: they go to those families whose incomes have fallen below a threshold or who have recently suffered job loss. Consequently, recipients are much more likely to spend these payments -- they have to. And in terms of making sure that all increases in public debt are spent, infrastructure spending is best of all - none of it can be saved; it all must be spent.

<Figure 2: "Bang-for-buck" from various multipliers for stimulus>

Is infrastructure investment "timely" enough to fight recessions?

Another criticism aimed at the ARRA was that it outlaid money too slowly. Infrastructure investments in general are often criticized for not being "timely" enough to work well as anti-recession measures – the "timely" mantra was one reason, for example, why infrastructure investments were dismissed almost across-the-board by policymakers when the first stimulus package of January 2008 was debated and passed.[1]

Given the length of the Great Recession, and the projected time it will take even from today to reach full-employment, it seems safe to say that this argument can be put to rest: we are in no danger of starting infrastructure programs of any kind that will "miss" the economy's need for more demand.

In regards to ARRA, this criticism of its un-timeliness is particularly ironic given that its boost to economic growth has actually fallen to nearly zero by the last half of 2010 – just as economic growth was decelerating. In short, the substantial boost to the economy from the ARRA has come and gone and the need for more demand remains. This fade-out of ARRA's overall effect happened even as substantial new green investments were still coming on-line and boosting jobs and incomes.

The mechanics behind these two facts - that the ARRA's overall impact is fading while valuable green investments are still coming on-line each day - is simple: the bulk of ARRA's *overall* spending and tax cuts were actually (and contrary to the "untimeliness" charge) quite front-loaded. Many of the tax cuts were largely spent in the first year of its implementation and transfers to state governments and to households were often just a matter of expanding existing programs, so these started boosting purchasing power right away.

By 2011, however, many of these tax-cuts and state-transfers had started to expire (some of the transfers to households also expired, though the largest – the boost to unemployment insurance benefits – has been extended through 2011). Because the rate of spend-out from the ARRA was falling by the last half of 2010, its impact on growth was falling as well.

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[1] It should be noted that not everybody dismissed infrastructure spending as effective stimulus in early 2008 – see Eisenbrey, Irons and Mishel (2008).

American Enterprise Institute for Public Policy Research

AEI

No. 1 • February 2011

Energy and Environment Outlook

The Myth of Green Energy Jobs: The European Experience

By Kenneth P. Green

With $2.3 billion in Recovery Act tax credits allocated for green manufacturers, President Barack Obama and other Democratic politicians have high hopes for green technology. But their expectations clash with both economic theory and practical experience in Europe. Green programs in Spain destroyed 2.2 jobs for every green job created, while the capital needed for one green job in Italy could create almost five jobs in the general economy. Wind and solar power have raised household energy prices by 7.5 percent in Germany, and Denmark has the highest electricity prices in the European Union. Central planners in the United States trying to promote green industry will fare no better at creating jobs or stimulating the economy.

Green is the new black, in both the United States and Europe. Virtually everyone on the left has thrown on the green pants, green shirts, and green cloak of what we are assured is the future of life on earth as we know it.

President Obama regularly references the green economy in his speeches. The Obama/Biden New Energy for America document released in 2008 focuses on green jobs, green technology, green manufacturing, green buildings, and even green veterans. In a speech to the Democratic National Committee in September 2010, Obama boasted, "We'd been falling behind and now we are back at the forefront of [research and development]. We made the largest investment in green energy in our history so that we could start building solar panels and wind turbines all around the country."[1]

In an August 13 speech, Vice President Joe Biden also sang the praises of greenness: "It's not enough to just rescue the economy, we have to rebuild it better—and that work begins with giving American manufacturers the resources to produce the clean, green energy technology that will be the foundation of our 21st century economy. With the launch today of $2.3 billion in Recovery Act tax credits for green manufacturers, we are going to ramp up manufacturing of green energy materials in this country, while creating thousands of new jobs right here in our own backyard. From wind and solar power to electric vehicle technology, our recovery is going to be fueled by the Recovery Act incentives we are offering businesses today that will be the engine of our economy tomorrow."[2]

Former speaker Nancy Pelosi (D-CA) also supports the green cause. A blurb describing a

Key points in this *Outlook*:

- The Obama administration, its allies in Congress, and the environmental community champion the benefits of green technology and the creation of green jobs to alleviate unemployment.
- Green jobs merely replace jobs in other sectors and actually contribute less to economic growth.
- Experiments with renewable energy in Europe have led to job loss, higher energy prices, and corruption.

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speech Pelosi gave to the Stanley School in Waltham, Massachusetts, begins, "For a brighter and more prosperous future, we must invest in a green infrastructure, a green economy, and green schools to create a workforce of good-paying green collar American jobs."[3]

> Governments do not "create" jobs; the willingness of entrepreneurs to invest their capital, paired with consumer demand for goods and services, does that.

Of course, Senator Harry Reid (D-NV) was not left out. At a Senate Democratic Green Jobs Summit in 2009, Reid boasted of his green accomplishments: "We have made unprecedented investments in clean, renewable energy and new, green jobs that can never be outsourced. In 2007 we passed a landmark energy bill that led to the development of clean, renewable fuels here at home, and the creation of critical American manufacturing jobs. We raised fuel-efficiency standards for the first time in a generation, and set new energy-efficiency standards for lighting, appliances, and federal office buildings and vehicles. In the economic recovery plan we passed this year, we invested $67 billion to develop clean energy, and $500 million more to train a new 'green-collar' workforce—Americans who each day will make our nation more energy efficient and energy independent."

So, at least on the left, it is unanimous: the world's future is green: green energy powering green technologies, creating green houses, buildings, cars, and jobs, jobs, jobs. But is this thinking based on realistic economics, realistic understanding about green technology, or realistic expectations of the growth potential of the green movement? This *Outlook* examines whether the government creates jobs through subsidies of any sort and then looks at the troubling European experience with green energy and job creation.

Green Energy and Green Jobs

To understand the fallacy of the government creating green jobs through subsidies and regulations, we have to refer to the writing of French economist Frédéric Bastiat. Back in 1850, Bastiat explained the fallacy that underlies such thinking in an essay about the unseen costs of such efforts. He called it the "broken window" fallacy.

The fallacy works as follows: imagine some shopkeepers get their windows broken by a rock-throwing child. At first, people sympathize with the shopkeepers, until someone claims that the broken windows really are not that bad. After all, they "create work" for the glassmaker, who might then be able to buy more food, benefiting the grocer, or buy more clothes, benefiting the tailor. If enough windows are broken, the glassmaker might even hire an assistant, creating a job.

Did the child therefore do a public service by breaking the windows? No. We must also consider what the shopkeepers would have done with the money they used to fix their windows, had those windows not been broken. Most likely, the shopkeepers would have plowed that money back into their store; perhaps they would have bought more stock from their suppliers or hired new employees.

Were the windows not broken, the town would still have had jobs created by the shopkeepers' alternate spending, plus the shopkeepers would have had the value of their original windows. Because the value of the windows was destroyed, however, they—and the village as a whole—have been made poorer.

It is well understood, among economists, that governments do not "create" jobs; the willingness of entrepreneurs to invest their capital, paired with consumer demand for goods and services, does that. All the government can do is subsidize some industries while jacking up costs for others. In the green case, it is destroying jobs in the conventional energy sector—and most likely in other industrial sectors—through taxes and subsidies to new green companies that will use taxpayer dollars to undercut the competition. The subsidized jobs "created" are, by definition, less efficient uses of capital than market-created jobs. That means they are less economically productive than the jobs they displace and contribute less to economic growth. Finally, the good produced by government-favored jobs is inherently a noneconomic good that has to be maintained indefinitely, often without an economic revenue model, as in the case of roads, rail systems, mass transit, and probably windmills, solar-power installations, and other green technologies.

To understand how this works in practice, I now turn to European countries that went hog wild for renewables, while singing the praises of green jobs: Spain, Italy, Germany, Denmark, the United Kingdom (UK), and the Netherlands.

Spain

Spain has long been considered a leader in the drive to renewable power. Indeed, Obama singled out Spain as an example in a 2009 speech. The president said, "We have enormous commercial ties between our two countries and we pledged to work diligently to strengthen them, particularly around key issues like renewable energy and transportation, where Spain has been a worldwide leader and the United States I think has enormous potential to move forward."[4]

But the story of Spain's green-job leadership took a series of hits shortly after the president's speech. In March 2009, researchers Gabriel Calzada Alvarez and colleagues at the Universidad Rey Juan Carlos released a study examining the economic and employment effects of Spain's aggressive push into renewables. What they found confounds the usual green-job rhetoric:[5]

- Since 2000, Spain spent €571,138 on each green job, including subsidies of more than €1 million per job in the wind industry.
- The programs creating those jobs destroyed nearly 110,500 jobs elsewhere in the economy (2.2 jobs destroyed for every green job created).
- The high cost of electricity mainly affects production costs and levels of employment in metallurgy, nonmetallic mining and food processing, and beverage and tobacco industries.
- Each "green" megawatt installed destroys 5.28 jobs elsewhere in the economy on average.
- These costs do not reflect Spain's particular approach but rather the nature of schemes to promote renewable energy sources.

Spain has found its foray into renewable energy to be unsustainable. *Bloomberg* reports that Spain slashed subsidies for new solar power plants.[6] As analyst Andrew McKillop observes in the *Energy Tribune*:

> In Spain, where subsidies to the country's massive windfarms and their dependent industries is estimated to have attained as much as 12 billion Euros in 2009, either directly or through "feed-in tariff" subsidy for power sales, government proposals target at least a 30% cut in subsidies. Major wind energy producer firms, such as Gamesa, have begun cutting their workforces, while trying to find sales outside Europe, helped by a weaker Euro. In addition and due to Spain's highly exposed deficit finance status, making it a target for market speculators betting its bond rates must rise, the Spanish government is also likely to cut financial backing to existing renewable energy power plants, built with an expectation of guaranteed prices and government subsidies for 25 years.[7]

And then, there is the matter of corruption. As *Bloomberg Businessweek* reports, "An audit of solar-power generation from November 2009 to January 2010 found that some panel operators were paid for doing the 'impossible'—producing electricity from sunlight during the night."[8] Further, it appears that the solar power producers "may have run diesel-burning generators and sold the output as solar power, which earns several times more than electricity from fossil fuels." Nineteen people have been arrested in Spain's "clean energy" sector on charges ranging from bribery, to unsavory land deals, to issuing licenses to friends and family, to simple construction fraud. As the *Guardian* reports, "When Spain's National Commission for Energy decided to inspect 30 solar gardens, it found only 13 of them had been built properly and were actually dumping electricity into the network."[9]

Italy

A similar situation has played out in Italy, also a leader in wind and solar-power deployment. A study performed by Luciano Lavecchia and Carlo Stagnaro of Italy's Bruno Leoni Institute found an even worse situation:

> Finally, we have compared the average stock of capital per worker in the RES [Renewable Energy Systems] with the average stock of capital per worker in the industry and the entire economy, finding an average ratio of 6.9 and 4.8, respectively. To put it otherwise, the same amount of capital that creates one job in the green sector, would create 6.9 or 4.8 if invested in the industry or the economy in general, respectively—although differences exist between RES themselves, with wind power more likely to create jobs than

> [photovoltaic] power. This fact is particularly relevant because we didn't even consider the non-trivial value of the renewable energy produced, but we focused on pure subsidies. If we had considered the energy value, the average stock of capital per worker would result even higher. Since subsidies are forcibly taken away from the economic cycle, and allocated for political purposes, it is especially important to have a clear vision of what consequences they beg.[10]

The researchers also found that the vast majority of green jobs created were temporary: "Using what we see as inflated estimates, from various sources, of already-existing green jobs, we take between 9,000 and 26,000 jobs in wind power, and between 5,500 and 14,500 in photovoltaic energy, as our starting point. From there, we have calculated that thanks to the subsidies Rome has promised, the number of people working in the green economy will rise to an aggregate total of between 50,000 to 112,000 by 2020. However, most of those jobs—at least 60%—will be for installers or other temporary work that will disappear once a photovoltaic panel, or a wind tower, is operative."[11]

And like Spain, Italy has experienced rampant corruption in the renewable sector. Rather than having numerous individuals defrauding the government, however, the mafia is involved. As Nick Squires and Nick Meo report in the *Telegraph*, "Attracted by the prospect of generous grants designed to boost the use of alternative energies, the so-called 'eco Mafia' has begun fraudulently creaming off millions of euros from both the Italian government and the European Union."[12] They go on to report:

> Eight people were arrested in Operation "Eolo," named after Aeolus, the ancient Greek god of winds, on charges of bribing officials in the coastal town of Mazara del Vallo with gifts of luxury cars and individual bribes of €30,000–70,000.
>
> Police wiretaps showed the extent of the mafia's infiltration of the wind energy sector when they intercepted an alleged mafioso telling his wife, "Not one turbine blade will be built in Mazara unless I agree to it."
>
> In another operation last November, code-named "Gone with the Wind," fifteen people were arrested on suspicion of trying to embezzle up to €30 million in European Union funds. Among those arrested on fraud charges was the president of Italy's National Wind Energy Association, Oreste Vigorito.

Wind and solar power have raised household energy prices by 7.5 percent in Germany, and Denmark has the highest electricity prices in the European Union.

Germany

Germany's foray into renewable energy started in earnest in 1997, when the European Union adopted a goal of generating 12 percent of its electricity from renewable sources.[13] Germany's method for achieving such targets was the institution of a feed-in law, which required utilities to purchase different kinds of renewable energy at different rates. In a study of the effects of Germany's aggressive promotion of wind and solar power, Manuel Frondel noted that the German feed-in law required utilities to buy solar power at a rate of fifty-nine cents per kilowatt-hour, far above the normal cost of conventional electricity, which was between three and ten cents. Feed-in subsidies for wind power, he observed, were 300 percent higher than conventional electricity costs.[14]

Needless to say, this massive subsidizing of wind and solar power attracted a lot of investors: after all, if the government is going to guarantee a market for several decades, and set a price high enough for renewable producers to make a profit from, capital will flow into the market. Germany became the second-largest producer of wind energy after the United States, and its investment in solar power was aggressive as well.

But according to Frondel, things did not work out as Germany's politicians and environmentalists said they would. Rather than bringing economic benefits in terms of lower-cost energy and a proliferation of green-energy jobs, the implementation of wind and solar power raised household energy rates by 7.5 percent. Further, while greenhouse gas emissions were abated, the cost was astonishingly high: over $1,000 per ton for solar power, and over $80 per ton for wind power. Given that the carbon price in the European Trading System was about $19 per ton at the time, greenhouse gas emissions from wind and solar were not great investments.

Frondel concludes that "German renewable energy policy, and in particular the adopted feed-in tariff scheme, has failed to harness the market incentives needed to ensure a viable and cost-effective introduction of renewable energies into the country's energy portfolio. To the contrary, the government's support mechanisms have in many respects subverted these incentives, resulting in massive expenditures that show little long-term promise for stimulating the economy, protecting the environment, or increasing energy security. In the case of photovoltaics, Germany's subsidization regime has reached a level that by far exceeds average wages, with per-worker subsidies as high as 175,000 €(US$240,000)." He adds:

> In conclusion, government policy has failed to harness the market incentives needed to ensure a viable and cost-effective introduction of renewable energies into Germany's energy portfolio. To the contrary, Germany's principal mechanism of supporting renewable technologies through feed-in tariffs imposes high costs without any of the alleged positive impacts on emissions reductions, employment, energy security, or technological innovation. Policymakers should thus scrutinize Germany's experience, including in the US, where there are currently nearly 400 federal and state programs in place that provide financial incentives for renewable energy. Although Germany's promotion of renewable energies is commonly portrayed in the media as setting a "shining example in providing a harvest for the world" (*The Guardian* 2007), we would instead regard the country's experience as a cautionary tale of massively expensive environmental and energy policy that is devoid of economic and environmental benefits.

As with Spain and Italy, Germany is finding it hard to continue to subsidize wind and solar power at existing levels. In May, the German parliament cut back the subsidy for domestic rooftop solar photovoltaic systems by 16 percent, with free-standing systems cut by 15 percent.[15]

Denmark

Denmark is yet another country that has made wind power a hallmark of its energy policy. Obama praised it for its aggressive wind-power program, telling an Earth Day audience in Iowa that "America produces less than 3 percent of our electricity through renewable sources like wind and solar—less than 3 percent. Now, in comparison, Denmark produces almost 20 percent of their electricity through wind power."[16] The US Energy Information Administration tells America's children that "Denmark ranks ninth in the world in wind power capacity, but generates about 20% of its electricity from wind."[17] That sounds impressive, but is it true?

Green programs in Spain destroyed 2.2 jobs for every green job created, while the capital needed for one green job in Italy could create almost five jobs in the general economy.

Not according to CEPOS, a Danish think tank, which issued a 2009 report entitled *Wind Energy, the Case of Denmark*.[18] The CEPOS study found that rather than generating 20 percent of its energy from wind, "Denmark generates the equivalent of about 19% of its electricity demand with wind turbines, but wind power contributes far less than 19% of the nation's electricity demand. The claim that Denmark derives about 20% of its electricity from wind overstates matters. Being highly intermittent, wind power has recently (2006) met as little as 5% of Denmark's annual electricity consumption with an average over the last five years of 9.7%."

The CEPOS study revealed that Denmark can only produce and consume as much wind power as it does due to a convenient circumstance: neighboring countries have a lot of hydro power that can quickly and effectively balance the flow of electricity on its energy grid, allowing it to export surplus wind capacity. "Denmark manages to keep the electricity systems balanced due to having the benefit of its particular neighbors and their electricity mix. Norway and Sweden provide Denmark, Germany and Netherlands access to significant amounts of fast, short term balancing reserve, via interconnectors. They effectively act as Denmark's 'electricity storage batteries.' Norwegian and Swedish hydropower can be rapidly turned up and down, and Norway's lakes effectively 'store' some portion of Danish wind power. Over the last eight years West Denmark has exported (couldn't use), on average, 57% of the wind power it generated and East Denmark an average of 45%. The correlation between high wind output and net outflows makes the case that there is a large component of wind energy in the outflow indisputable."

Finally, the CEPOS study found that Danish consumers are the ones who take it on the chin. Denmark's electricity prices are the highest in the entire European Union. And the greenhouse gas reduction benefits? Slim to none, since the exported wind power replaces hydro power, which does not produce significant greenhouse gas emissions. The wind power consumed in Denmark does displace some fossil-fuel emissions, but at some cost: $124 per ton, nearly six times the price on the European Trading System.

Regarding green jobs, CEPOS found "that the effect of the government subsidy has been to shift employment from more productive employment in other sectors to less productive employment in the wind industry. As a consequence, Danish GDP is approximately 1.8 billion DKK ($270 million) lower than it would have been if the wind sector work force was employed elsewhere."

Not surprisingly, Denmark is also finding renewable power unsustainable and is backing away from the technology. As Andrew Gilligan reports in the *Telegraph*, the Danish state-owned power industry will no longer build onshore wind turbines, and consumers are complaining about high energy rates and environmental despoliation. "Earlier this year, a new national anti-wind body, Neighbours of Large Wind Turbines, was created. More than 40 civic groups have become members. 'People are fed up with having their property devalued and sleep ruined by noise from large wind turbines,' says the association's president, Boye Jensen Odsherred. 'We receive constant calls from civic groups that want to join.'"[19]

The United Kingdom

Our Commonwealth cousins across the pond have also embraced the "green power means green jobs" theory. The UK (Scotland particularly) has pursued an ambitious wind-power agenda.

Former prime minister Gordon Brown told a Labor Party conference, "I am asking the climate change committee to report by October on the case for, by 2050 not a 60% reduction in our carbon emissions, but an 80% cut and I want British companies and British workers to seize the opportunity and lead the world in the transformation to a low carbon economy and I believe that we can create in modern green manufacturing and service one million new jobs."[20]

Ed Miliband, current leader of the opposition, is also big on wind, announcing, "With strong government backing, the UK is consolidating its lead in offshore wind energy. We already have more offshore wind energy than any other country, we have the biggest wind farm in the world about to start construction, and now we'll see the biggest turbine blades in the world made here in Britain. . . . Our coastline means the offshore wind industry has the potential to employ tens of thousands of workers by 2020."[21]

Party does not seem to be a factor in green-job boosting. Prime Minister (and Conservative Party leader) David Cameron, discussing a deal to work on wind turbines with India, said, "The innovation and creativity of business won't just help us save the planet, but is expected to create millions of jobs and billions of revenue in the green goods and services market."[22]

Referring to offshore wind, Cameron is equally bullish: "I want us to be a world leader in offshore wind energy," he said, announcing a national infrastructure plan. "We are making these investments so that major manufacturers will decide that this is the place they want to come and build their offshore wind turbines. This investment is good for jobs and growth, and good for ensuring we have clean energy."[23]

Alas, the UK and Scotland have fared no better than the other countries discussed above in their pursuit of the new green-energy/green-jobs economy, as a recent report by consultancy Verso Economics points out.[24] The study is particularly interesting because its methodology is touted as superior to the methodology used in the Spanish and Italian studies. Verso uses what economists refer to as "input/output" tables to estimate the number of jobs that were foregone in the UK general economy in favor of the green jobs "created" through government subsidies.

Verso's conclusion aligns neatly with those of the Spanish and Italian studies discussed above:

- "The report's key finding is that for every job created in the UK in renewable energy, 3.7 jobs are lost. In Scotland there is no net benefit from government support for the sector, and probably a small net loss of jobs."

- "The main policy tool used to promote renewable energy generation is the Renewables Obligation, which effectively raises the market price paid for electricity from renewable sources. This scheme cost electricity consumers £1.1 [billion] in the UK and around £100 [million] in Scotland in 2009/10."

- "This report uses the Scottish Government's own macroeconomic model for Scotland to assess the impact of identified costs on jobs. A similar model was used by the Scottish Government to measure the opportunity cost of the cut in [the value-added tax] implemented in 2008–09. Based on this, policy to promote renewable energy in the UK has an opportunity cost of 10,000 direct jobs in 2009/10 and 1,200 jobs in Scotland."

- "In conclusion, policy to promote the renewable electricity sector in both Scotland and the UK is economically damaging. Government should not see this as an economic opportunity, therefore, but should focus debate instead on whether these costs, and the damage done to the environment, are worth the candle in terms of climate change mitigation."[25]

While the UK and Scotland may have avoided the problems of corruption that afflicted Spain and Italy, they learned something that the warmer countries did not: wind turbines can freeze in winter. Not only do they cease to put out power in very cold weather, they actually need to be heated. As reporter Richard Littlejohn points out in the UK *Daily Mail*, "Over the past three weeks, with demand for power at record levels because of the freezing weather, there have been days when the contribution of our forests of wind turbines has been precisely nothing. It gets better. As the temperature has plummeted, the turbines have had to be heated to prevent them seizing up. Consequently, they have been consuming more electricity than they generate. Even on a good day they rarely work above a quarter of their theoretical capacity. And in high winds they have to be switched off altogether to prevent damage."[26]

The frozen turbine problem has also occurred in Canada. As Greg Weston of the *Telegraph-Journal* explained in February 2011, "A $200-million wind farm in northern New Brunswick is frozen solid, cutting off a supply of renewable energy for NB Power. The 25-kilometre stretch of wind turbines, 70 kilometres northwest of Bathurst, has been shut down for several weeks due to heavy ice covering the blades. GDF Suez Energy, the company that owns and operates the site, is working to return the windmills to working order, a spokeswoman says."[27]

The Netherlands

The Netherlands is yet another country that went big for wind power; it is the world's third-largest producer of offshore wind power. And while no data are available about green jobs in the Netherlands, there is evidence that it will not be producing many through its green power plants. The new conservative government has radically reversed course and is slashing subsidies to wind and solar power.

According to the journal *Energy Debate*, the Dutch government has lost its faith in windmills. The new government in the Netherlands has taken exception to the massive subsidies required to build and operate wind farms—and, in this case, to the expected export of €4.5 billion in subsidies to a German company (Bard Engineering) that would have built, owned, and operated those wind farms. The new prime minister of the Netherlands, Mark Rutte, is reported to have said, "Windmills turn on subsidies."[28]

On November 30, 2010, the government unveiled its new renewables plan, slashing annual subsidies from €4 billion to €1.5 billion. And not only are the subsidies cut back, what remains will be redirected well away from wind power. As *Energy Debate* explains:

> In the new system (somewhat misleadingly called SDE-plus), which will take effect halfway through 2011, the government will allocate subsidies in an entirely different, and rather complicated way. Subsidies are made available in four "stages" (on the basis of first-come, first-served).
>
> 1) In the first stage, a government subsidy of 9 eurocents per kWh (or 79 cents per m^3 for gas) is offered, but only to producers of technologies that have "deficits" of less than 9 eurocents. Based on the figures from ECN, these are: biogas ("green gas"), hydropower, power from waste processing installations, and gas from fermentation processes.
>
> 2) If there is still money left after this first stage, the second stage will be opened up, in which a subsidy of 11 eurocents per kWh (or 97 cents per m^3) will be offered. This stage will be open to producers of onshore wind power and fertiliser-based gas.

> 3) Again, if there is money left, there will be a third stage with subsidies of 13 cents per kWh or 114 cents per m^3. This will be open to producers of hydropower and small-scale biomass.
>
> 4) The fourth and last stage (15 cents per kWh or 132 cents per m^3) will be open to electricity produced from all-purpose fermentation processes.
>
> Not included in any of the four categories, because they are too expensive, are solar power, large-scale biomass and, indeed, offshore wind power.[29]

Another change in the Dutch attitude toward renewables is how to pay for the subsidies. In the past, subsidies came from the general budget. Moving forward, consumers will see a surcharge on their energy bills. The new direct billing could cool the public's ardor for additional building of "green energy."

According to reports, the new government was planning on a nuclear power renaissance to generate electricity, and one could certainly argue that such a plan would generate "green jobs."[30] However, in the wake of the tragic Japanese earthquake and tsunami in March 2011, such a plan will also undergo a great deal of scrutiny.

The irony here is rich. The Dutch, who have been enamored of wind power for hundreds of years,[31] may have finally had enough tilting at windmills. If even they cannot make it work, one has to wonder if anyone can.

Conclusion

Both economic theory and the experience of European countries that have attempted to build a green-energy economy that will create green jobs reveal that such thinking is deeply fallacious. Spain, Italy, Germany, Denmark, the UK, and the Netherlands have all tried and failed to accomplish positive outcomes with renewable energy. Some will suggest that the United States is different, and that US planners will have the wisdom to make the green economy work here. But there is no getting around the fact that you do not improve your economy or create jobs by breaking windows, and US planners are no more omniscient than those in Europe.

I would like to thank AEI research assistant Hiwa Alaghebandian for her valuable assistance with this Outlook.

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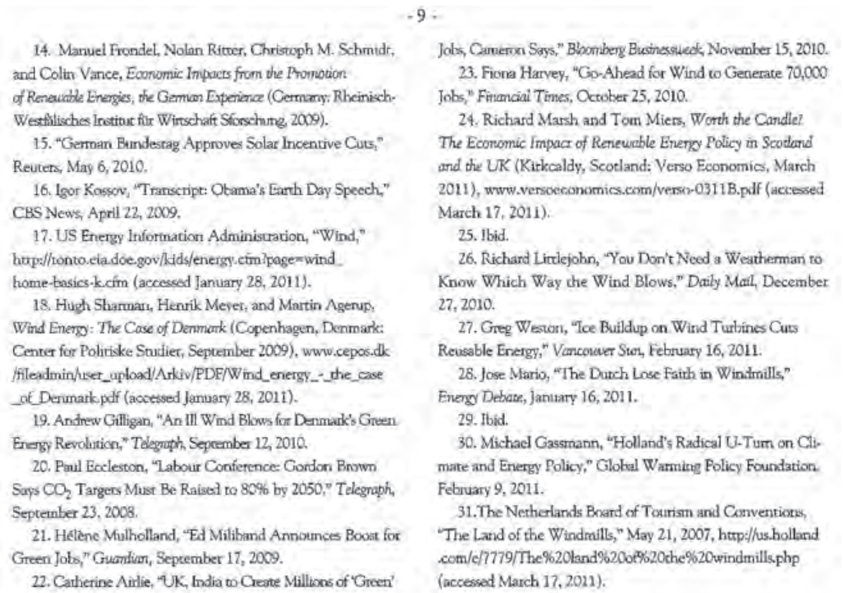

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Chairman BROUN. Thank you, Dr. Green.

I now recognize our next witness, Dr. David Kreutzer.

Mr. KREUTZER. I will read my statement here. It says, my name is David Kreutzer.

Chairman BROUN. Kreutzer.

Mr. KREUTZER. And I have to confess that I had to call your receptionist to figure out how to pronounce your name. I hope I get it right.

Chairman BROUN. You are recognized for five minutes, Doctor.

Mr. KREUTZER. Okay. Thank you.

STATEMENT OF DR. DAVID KREUTZER, RESEARCH FELLOW IN ENERGY, ECONOMICS, AND CLIMATE CHANGE, THE HERITAGE FOUNDATION

Mr. KREUTZER. I am Research Fellow in Energy Economics and Climate Change at The Heritage Foundation. The views I express in this testimony are my own and should not be construed as representing any official position of The Heritage Foundation.

Chairman Broun, Ranking Member Edwards, and distinguished members of the committee, thank you for giving me this opportunity to discuss the employment impacts of federal energy and climate policies.

I would like to make two fundamental points today. The first is that government regulation is costly. The second is that government spending is costly. Both of these statements are true whether the economy is at full employment or in a recession.

Now, let me also say that government spending and regulation can have benefits, but we need to compare those benefits to the costs instead of pretending that there are no costs.

Too often proponents of spending and regulation focus on the jobs and income going to those who receive the government money or who provide the necessary goods and services for compliance with the regulations. They ignore the losses to the other parts of the economy that are needed to finance these jobs.

A report by the Blue Green Alliance and the Economic Policy Institute sets out an analogy to try to explain why an apparently ineffective Stimulus program was actually effective but undersized. Though probably not the intent of the authors, and I believe in a few minutes we will hear about that, the analogy captures the flawed logic of virtually every green jobs study I have seen.

Here is the quote from that report. “A good metaphor for this controversy is the temperature in a log cabin on a cold winter’s night. Say the weather is forecast for the temperature to reach 30 degrees. To stay warm you decide to burn three logs in a fireplace. You do the math and chemistry and calculate that burning these three logs will generate enough heat to bring the inside of the cabin to 50 degrees or 20 degrees warmer than the ambient temperature. But the forecast is wrong, and instead of—and instead temperatures plummet to 10 degrees, and burning the logs only results in a cabin temperature of 30 degrees. Has log burning failed as a strategy to generate heat?”

The flaw in this analogy is that there isn’t any woodshed. The only available logs come from the walls of the cabin. It would be no surprise that burning more of the wall does not make the cabin warmer. Likewise, there is no money shed from which the government can finance all the green subsidies and programs. These resources are extracted from other parts of the economy. They do not and cannot come from outside of the economy.

Yes, when firms receive government subsidies, there may be additional jobs with those firms, just as it may get warmer right by the fireplace when more logs are torn from the wall and burned. But just as the overall cabin temperature will plummet, the overall economy suffers as resources are taken from better uses and put to less valued ones.

There is no money shed to finance the cost of complying with a cap-and-trade regime such as Waxman-Markey. Indeed, Heritage analysis estimated that such legislation would reduce national income as measured by gross domestic product by nearly $9 trillion over the first 25 years of the program can cause employment losses of nearly 2.5 million jobs.

There is no money shed to pay compliance costs of EPA regulations. There is no money shed to subsidize loan guarantees. Let me just use one example of the examples from my written testimony. The case of Solyndra. In the fall of 2009, Solyndra, a solar panel manufacturer, received a loan guarantee of $535 million. That is in the fall of 2009. In the spring of 2010, half a year later or less, Solyndra failed to successfully complete its initial public offering because an independent audit questioned the viability of the company as people weren't going to buy the stocks. In the fall of 2010, Solyndra actually closed one of its manufacturing facilities that had been in operation when they got the loan.

There is no money shed to finance green Stimulus programs. Even in a time of recession with under-utilized resources there are costs to government expenditure whether it is purchasing military jets, building highways, or subsidizing green energy projects.

But even if government spending can stimulate the economy, and that doesn't mean there are no costs, but if the government can stimulate the economy, the spending needs to be correctly timed, and the targets should be those with the best return for the money. Spending that raises electricity rates does not fit this bill.

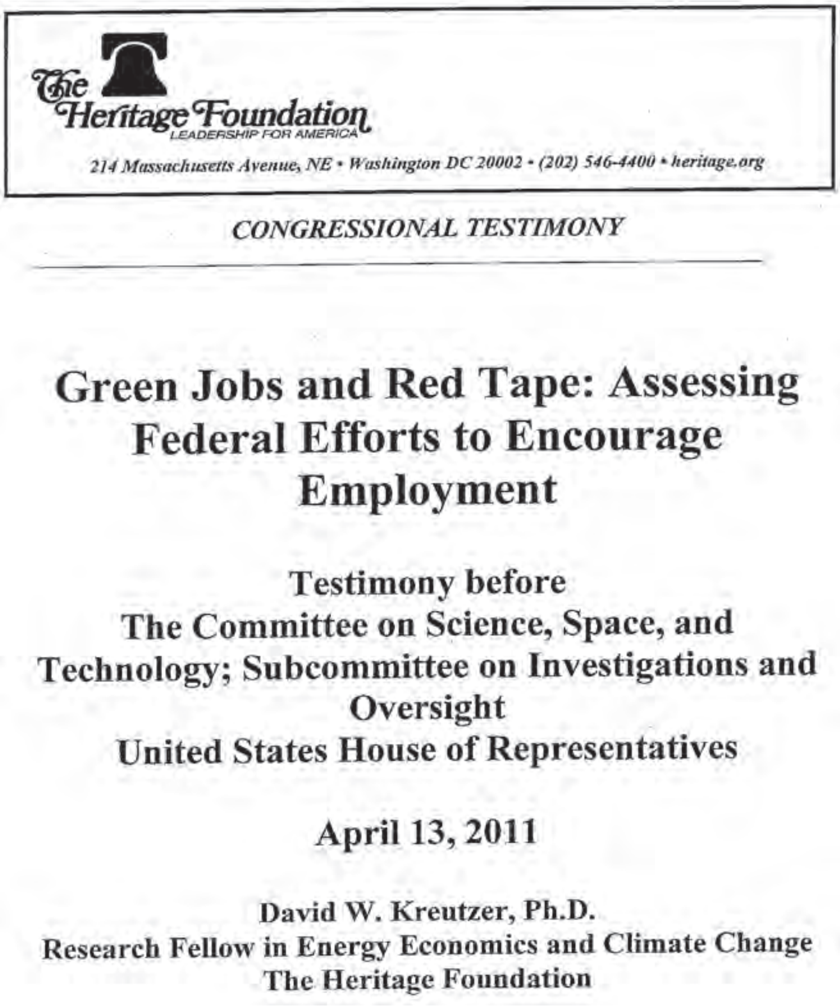
Figure six from the Blue Green Alliance Economic Policy Institute report, reproduced in my written testimony, purports to show that GDP, consumption, and employment all improved after the enactment of the ARRA Stimulus Bill.

However, using the measures offered in the chart, okay, rates of change at an annualized rate, it clearly shows that all three measures of economic activity were turning the corner months before any Stimulus spending started.

Thank you.

[The prepared statement of Mr. Kreutzer follows:]

PREPARED STATEMENT OF DR. DAVID KREUTZER, RESEARCH FELLOW IN ENERGY, ECONOMICS, AND CLIMATE CHANGE, THE HERITAGE FOUNDATION



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CONGRESSIONAL TESTIMONY

Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment

Testimony before
The Committee on Science, Space, and Technology; Subcommittee on Investigations and Oversight
United States House of Representatives

April 13, 2011

David W. Kreutzer, Ph.D.
Research Fellow in Energy Economics and Climate Change
The Heritage Foundation

My name is David Kreutzer. I am Research Fellow in Energy Economics and Climate Change at The Heritage Foundation. The views I express in this testimony are my own, and should not be construed as representing any official position of The Heritage Foundation.

Chairman Broun, Ranking Member Edwards, and distinguished members of the subcommittee, thank you for giving me this opportunity to discuss the employment impacts of federal energy and climate policies.

When the savings of new, more energy efficient technologies exceed the costs of adopting those technologies, markets have the incentive to adopt them. Indeed the difference between the savings and the costs is the measure of the increased value the economy generates. But it is the voluntary participants in these market transactions that best know the full spectrum of the costs and benefits that matter most to them. While engineers, accountants, technicians, and others might help to inform consumers and producers, no number of green eyeshades, calculators, and lab equipment can substitute for a consumer's or firm owner's own determination of value.

In other words, policies mandating energy technologies that markets resist will reduce national income and slow the economic growth that generates good new jobs.

In addition, it does not matter how an economy's scarce resources are diverted from their most valued uses. Whether by a cap-and-trade law, or regulatory policy, or by subsidies, when consumers or producers are forced to use or pay for expensive or less suitable energy sources or technologies, the value of their production and consumption drops.

Cap-and-Trade Non-Stimulus

A popular misconception encouraged by many in the debate over the cap-and-trade bills, such as Waxman–Markey, was that restricting access to affordable fossil fuels leads to even greater economic activity as markets adapt to the new, artificial constraints. Such a conclusion implies that the new substitutes, whether they be products or processes, are so superior and/or so much cheaper in comparison to the old technology that consumers and producers find the benefits exceed the costs. However, it is exactly this sort of better substitute that markets are constantly striving to find.

The notion that cap-and-trade will have costs in terms of lost national income is not one peculiar to analysts at conservative think tanks. In September of 2009 a panel of economists from the Brookings Institution, the Environmental Protection Agency, the Congressional Budget Office, the Energy Information Administration, and The Heritage Foundation presented their different findings on the economic impact of cap-and-trade policies. None of the economists argued that cap-and-trade would stimulate the economy. Instead, the debate was over how much the economy would be harmed.[1]

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[1] "Cap and Trade: Comparing Cost Estimates," Heritage Foundation event, September 21, 2009, at *http://www.heritage.org/Events/2009/09/Cap-and-Trade-Comparing-Cost-Estimates*.

The Heritage Foundation estimated that the Waxman–Markey bill would have cost the economy hundreds of billions of dollars per year and led to an aggregate loss of near $10 billion by 2035. The disruption would have cut employment by nearly 2.5 million jobs by 2035.[2]

Regulation Non-Stimulus

A recent paper by Ceres claimed that the EPA's costly regulations of the electric power sector would create jobs.[3] Indeed, their analysis shows that the more costly it is for the electric power industry to comply with the regulations, the more jobs are created. This nonsensical conclusion is the unavoidable result of fundamentally flawed analysis.

The Ceres report borrows estimates of the cost of meeting the new pollution standards imposed by the EPA. Plugging this amount, $196 billion, into an input-output table they generate 1.5 million job-years (erroneously referred to as "jobs" in the executive summary and in their press release). The fatal, and glaring, error in the calculation is they ignore the opportunity cost of the $196 billion in the first place. This is a pure example of the broken-windows fallacy—the fallacy that asserts breaking windows is good for the economy because somebody has to repair them.

Because the $196 billion is not free money, it represents the diversion of resources (including jobs) away from other production.

Stimulus Non-Stimulus

Last October the director of the Department of Energy's Loan Program Office, David Frantz, gave an update of the department's loan-guarantee programs funded by the American Recovery and Reinvestment Act (ARRA or Stimulus).[4] The criteria he outlined highlight the problems with allocating capital via the political process. Two of the criteria presented were mutually exclusive. The first was funded projects should be commercially viable. The second was those seeking funding must demonstrate the projects cannot get private financing. For many economists, the inability to get private financing would be the definition of not being commercially viable.

Government loans and loan guarantees alter the paths of capital allocation towards loans with greater political rates of return relative to actual financial rates of return. In the slides presented last October, Mr. Frantz listed four projects for which the loan processes had been finalized.[5] It is illuminating to review the paths those projects have taken since receiving loans.

The first, Solyndra, received a loan guarantee for $535 million in the fall of 2009. In the spring of 2010 it failed to complete its initial public offering after an independent audit questioned the ongoing viability of the firm.[6] Then, in the fall of 2010, the firm closed one of its manufacturing facilities and laid off 180 workers.[7]

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[2] William Beach *et al.*, "The Economic Impact of Waxman–Markey," Heritage Foundation *WebMemo* No. 2438, May 13, 2009, at *http://www.heritage.org/Research/Reports/2009/05/The-Economic-Impact-of-Waxman-Markey*.

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[4] U.S. Chamber of Commerce Emerging Technologies Committee Meeting, October 29, 2010, at *http://www.uschamber.com/issues/energy/emerging-technologies-committee-fall-meeting-2010-spotlight-technology-finance-and-lia* (April 10, 2010).

[5] U.S. Department of Energy, "Loan Guarantee Program Status Update," October 29, 2010, at *http://www.uschamber.com/sites/default/files/issues/environment/files/LGP%20Update%20_Chamber_102910_Final.pdf* (April 10, 2011)

The second, Beacon Power, received a $43 million loan guarantee in July of 2009. Since then its stock price has dropped by half—a period during which the Dow-Jones Industrial Average has increased over 40 percent.[8]

The third, First Wind Holdings, received a $117 million loan guarantee in March of 2010, but withdrew its initial public offering in October of 2010.[9]

The fourth, Nevada Geothermal Power's Blue Mountain geothermal project, appears on track. Nevada Geothermal has entered into a 20-year power purchase agreement with the Nevada utility, NV Power.

Three of the four recipients give evidence that their inability to secure private financing was not due to market failures.

But what is the overall impact of the Stimulus package on the economy and employment? A recent report by the Blue Green Alliance and the Economic Policy Institute offers both an excellent analogy for why the Stimulus bill's green subsidies cannot improve the economy, and a chart showing that it does not. Though, that does not appear to be the authors' intent.

The study notes that after the enactment of the Stimulus bill, the unemployment rate not only increased further, but exceeded even the Obama Administration's own forecast for the no-policy case. That is, the implication is that the policy made the economic situation worse. In trying to explain why the Stimulus package was effective never-the-less, the authors write,

"A good metaphor for this controversy is the temperature in a log cabin on a cold winter's night. Say that the weather forecast is for the temperature to reach 30 degrees. To stay warm, you decide to burn three logs in the fireplace. You do the math (and chemistry) and calculate that burning these three logs will generate enough heat to bring the inside of the cabin to 50 degrees – or 20 degrees warmer than the ambient temperature. But the forecast is wrong – and instead temperatures plummet to 10 degrees and burning the logs only results in a cabin temperature of 30 degrees. Has log-burning failed as a strategy to generate heat? Of course not."[10]

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[6] David Freddoso, "Obama's Big Green Gamble: Solyndra," *The Washington Examiner*, July 14, 2010, at *http://washingtonexaminer.com/node/65146#* (April 10, 2011)

[7] Ronnie Greene and Matthew Mosk, "Green Bundler With The Golden Touch," *The Huffington Post*, March 30, 2011, at *http://www.huffingtonpost.com/2011/03/30/green-bundler-with-the-golden-touch_n_842863.html* (April 10, 2011).

[8] Morningstar.com, Historical Prices, BCON, at *http://performance.morningstar.com/stock/performance-return.action?ops=p&p=price_history_page&t=BCON&region=USA&culture=en-US* (April 10, 2011).

[9] Steven Syre, "First Wind IPO Sputters Suddenly," *The Boston Globe*, October 29, 2010, at *http://articles.boston.com/2010-10-29/business/29332105_1_ipo-market-ipo-expectations-stock* (April 10, 2010).

[10] Jason Walsh, Josh Bivens, and Ethan Pollack, "Rebuilding Green: The American Recovery and Reinvestment Act and the Green Economy," Blue Green Alliance and the Economic Policy Institute, February 2011, p. 16, at *http://www.bluegreenalliance.org/admin/publications/files/BGA-EPI-Report-vFINAL-MEDIA.pdf* (April 10, 2011).

This metaphor is a perfect example of a logical flaw that typifies green-jobs studies in general. The flaw is there is no woodshed. The only logs available are the ones from the walls of the cabin. So, it would be no surprise to find it gets colder as the walls are torn down to be burned. Burning six logs instead of three will only double the size of the hole in the wall.

Likewise, there is no money shed from which the government can finance all the green subsidies. These resources are extracted from other parts of the economy. They do not, and cannot, come from outside the economy.

Yes, when firms receive government subsidies there may be additional jobs at those firms, just as it may get warmer right by the fireplace when more logs are torn from a wall and burned. But just as the overall cabin temperature will plummet, the overall economy suffers as resources are taken from better uses and put to less valued ones.

Figure 6 from the Blue Green/Economic Policy Institute study is attached. (Arrows added.) It plots the percent changes in gross domestic product (GDP), the percent change in consumption, and the change in payroll jobs from the first quarter of 2008 through the second quarter of 2010. Using the metrics chosen by the study's authors, consumption starts its rebound in the third quarter of 2008; GDP starts its rebound in the fourth quarter of 2008; and employment starts its rebound in the first quarter of 2009; but it is another three months (the second quarter of 2009) before the Stimulus spending even begins. By all three measures the economy had turned the corner before the first dollar of Stimulus money was spent.

Forcing taxpayers to subsidize energy they would not buy at its full price does not save them money, nor does it make production more profitable. Raising costs of production and reducing consumers' real income does not stimulate the economy.

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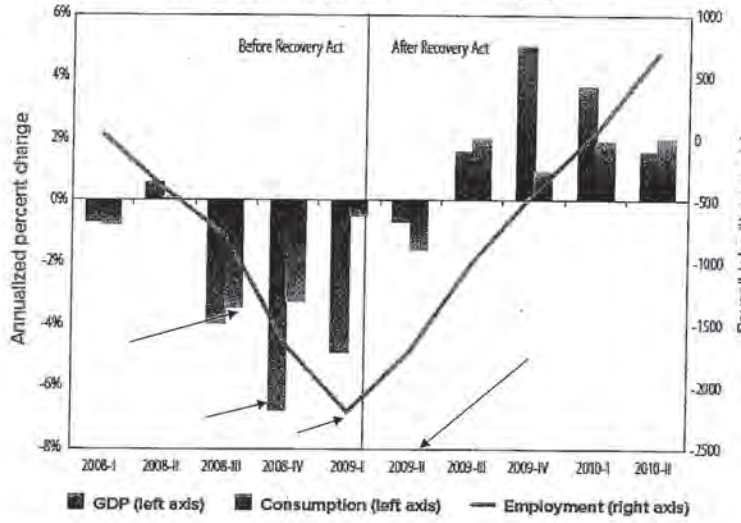
FIGURE 6. Quarterly change in real GDP, consumption expenditures, and employment



Source: EPI analysis of Bureau of Labor Statistics data and Bureau of Economic Analysis data. [11]

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[11] *Ibid.*, page 17.

Chairman BROUN. Thank you, Dr. Kreutzer. Is that better? Thank you, Dr. Kreutzer.

Our next witness is Dr. Josh Bivens with Economic Policy Institute. You are recognized for five minutes, Doctor.

STATEMENT OF DR. JOSH BIVENS, ECONOMIST, ECONOMIC POLICY INSTITUTE

Mr. BIVENS. I would like to thank the chairman and members of the committee for the opportunity to testify today. I am Josh Bivens. I am an economist at the Economic Policy Institute. Today's testimonies reflect only my own views.

I would make a couple relatively quick points about the efficacy of what we are going to call green investments. I mean, essentially they have two benefits. One is in the short run we have a pressing problem of very high unemployment rates, and the reason why we have those high unemployment rates is because there is a shortfall in demand for goods and services in the economy. Green investments will help plug that shortfall, bring down the unemployment rate in the short run.

In the longer run the reasons why you undertake green investments is because it is recognized that we need to transition to a cleaner energy economy for many reasons, one just for the health of citizens of the United States, coal-fired power plants are very bad for that health, and also to deal with the effects of climate change.

Let me take these in order. Obviously the most pressing problem facing the U.S. economy over the short-time horizon is high rates of unemployment, and we know why unemployment is high today. There is a shortfall of demand in the economy because an $8 trillion bubble in home prices destroyed household balance sheets, made households cut back on spending, destroyed the residential construction industry, cascaded throughout the economy, had businesses cutting back their capital spending because customers stopped coming through the door. Essentially, it is clear why unemployment is high today. There is a shortfall of demand in the U.S. economy.

The shock to private sector demand stemming from the bursting housing bubble is actually larger than the shock that led to the Great Depression. A key reason why we didn't have a second depression is that we allowed fiscal support, debt finance, increases in spending, and decreases in taxes to act as a shock absorber. Until the economy reaches pre-recession unemployment rates, further fiscal support would provide similarly welcome downward pressure on the unemployment rate.

For the simple purpose of propping up demand in our economy hit by a negative spending shock, you know, most kinds of spending and transfer payments are going to be as good as the others, but the architects of the American Recovery and Reinvestment Act, since we decided to make sure that many of these investments are long-term gains as well, and so they essentially were dedicated to providing a down payment on making a needed transition to a clean energy economy.

The effects of ARRA have become controversial among policymakers, and that is really odd because these effects are not controversial at all among professional economic forecasters. People in the private sector and the public sector whose salary depends on knowing what is going to happen in the economy over the next couple of years are unanimous that the Recovery Act boosted GDP, jobs, and reduced the unemployment rate.

The argument against the effectiveness of RA is kind of through a simple feat. It didn't work because we know it cannot work. It essentially says that any money borrowed by the government to finance Stimulus takes money out of the hands of households and businesses who will spend less.

You know, this is just wrong. The recession happened because households and businesses were saving too much to generate enough demand to keep unemployment low. If the government didn't do anything, that would be the end of the story. We would be stuck at a high unemployment economy for quite some time.

If the government instead decided to accommodate the savings that households and businesses were already doing, the savings was already there, if they just accommodated the savings by swapping money for treasury bonds and then spending the money on public sector investments to generate demand, then you would put more people to work, and that is exactly what has happened.

Essentially, opponents of Stimulus want to argue that public spending chases away private spending by competing with it for scarce resources, but scarce resources are not the problem in the U.S. economy right now. Labor, not scarce. There is four and a half unemployed workers for every job in the economy. Corporations are sitting on record amounts of cash ready to finance investment. The problem is not scarce resources. The problem is demand, and green investments help solve that problem.

In the longer term, say longer than five years, assuming once, again, we get to some tolerable unemployment rate, the primary benefit of green investments isn't in boosting the net number of jobs in the U.S. economy, rather the benefits are in making the U.S. economy more productive and better poised to meet the demand of transitioning to a cleaner energy economy in the future.

In my written testimony I go over the evidence that says a larger stock of public capital, public investments would do much to boost U.S. productivity. I won't rehash that here.

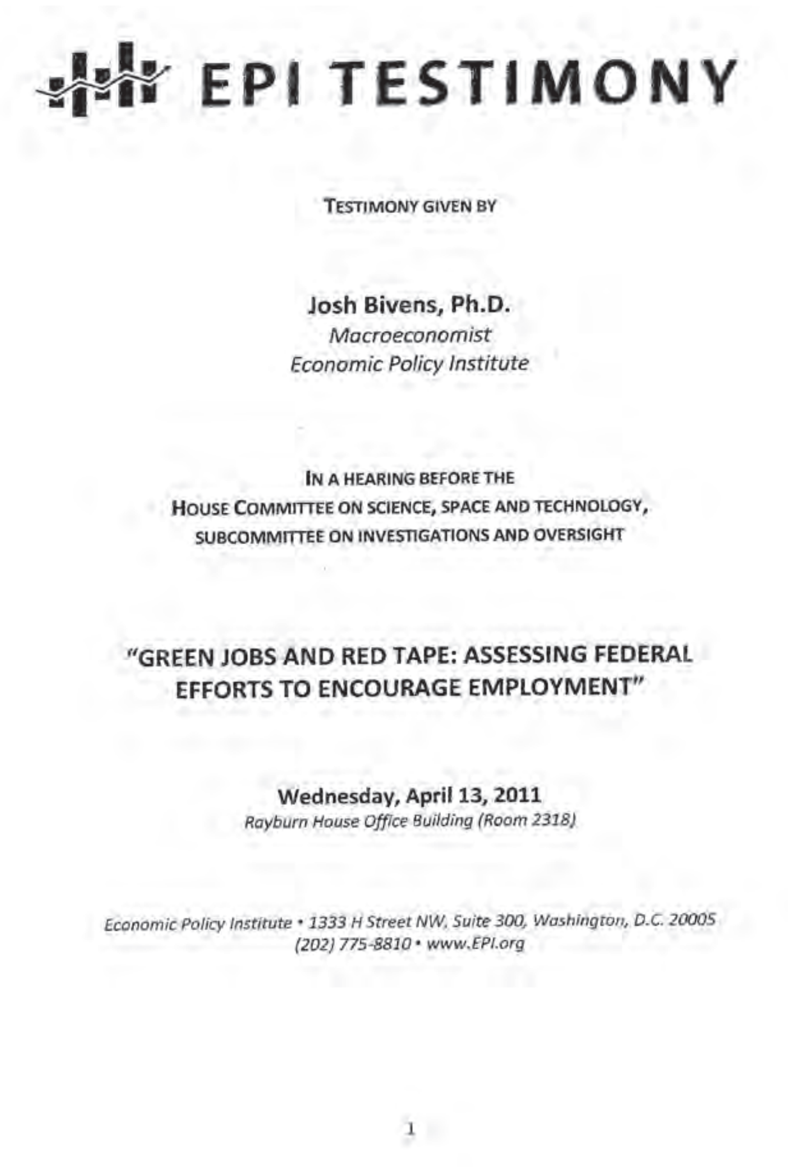
Last, I just want to sort of address the argument that green investment is just picking winners that the private sector is somehow by definition better at doing. Yeah. I don't think that is right. I mean, one, policy failures have so far not given the private sector the right price signals to incentivize green investment. You know, greenhouse gas emissions are free for individual emitters, but they are very costly for other stakeholders in the economy until this externality is priced, you know, the best way to price it would be through market-based programs like cap-and-trade. I know that is not going to happen soon. There is going to be stunning incentive for the private sector to undertake the optimal amount of green investment so the government has to step in and do some of it.

And further, many of these green investments are for public goods, goods that are less viable, less excludable than private goods, and or have features of natural monopolies. This is the textbook example of goods that should be provided by the government, not the private sector, so the idea that we are chasing away the private sector from providing these goods and services I think is pretty clearly wrong.

So I would like to just thank you again for the opportunity to testify, and I am happy to answer any questions you might have.

[The prepared statement of Dr. Bivens follows:]

PREPARED STATEMENT OF DR. JOSH BIVENS, ECONOMIST, ECONOMIC POLICY INSTITUTE



EPI TESTIMONY

TESTIMONY GIVEN BY

Josh Bivens, Ph.D.
Macroeconomist
Economic Policy Institute

IN A HEARING BEFORE THE
HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY,
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

"GREEN JOBS AND RED TAPE: ASSESSING FEDERAL EFFORTS TO ENCOURAGE EMPLOYMENT"

Wednesday, April 13, 2011
Rayburn House Office Building (Room 2318)

Economic Policy Institute • 1333 H Street NW, Suite 300, Washington, D.C. 20005
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Introduction

The U.S. economy faces large short-term and long-term challenges. The short-term challenge is reducing extremely high rates of joblessness – more than a year and half after the Great Recession officially ended unemployment remains very close to 9% and will likely average over this number for the entirety of 2011. The long-term challenge is a growing infrastructure deficit that threatens to drag on productivity growth and, most importantly, impede efforts to deal with the threat of global climate change.

The solution to the short-term challenge is simple – the U.S. economy is not producing enough jobs because there is still not enough aggregate demand for goods and services to boost demand for labor high enough to drive down the unemployment rate. The source of this demand shortfall is easy to identify – the bursting of the $8 trillion housing bubble that provided a devastating wealth shock to American households, forcing them to cut back on spending. The burst housing bubble also led to an extreme contraction in the residential home-building sector of the economy. As households pulled back spending and demand generated by home-building evaporated, this cascaded throughout the rest of the economy, leading to large declines in other aspects of business investment.

Given that the source of today's joblessness problem is insufficient demand, the solution is for macroeconomic policymakers to pull the policy levers available to them to increase this demand. In the case of policy controlled by Congress, this means increasing government spending (both direct spending and transfers) and financing these increases with debt. This has been done since the Great Recession began, but just not enough to overcome the size of the negative shock to private sector spending caused by the bursting housing bubble. Arguing that no more can or should be done because the response to the Great Recession was historically ambitious (and it was) is the wrong way to think about the problem – withdrawing fiscal support to the economy now while joblessness remains historically high would be like firefighters walking away from a burning building on the rationale that 'we dumped more water on it than we ever have before yet it's still burning – so water must not be working'.

The solution to the long-term challenge is almost as straightforward – a substantial effort to boost infrastructure spending, in particular policies that help address the problem of global climate change – must be undertaken.

A key plank of a long-run campaign to boost infrastructure investments in the U.S. economy needs to deal with externalities – the fact that many economic activities (driving, industrial emissions of GHGs) are cheap (sometimes even subsidized) for individual users but impose large economy-wide costs on other stakeholders in the economy. The U.S. economy must both enact policies that allow markets to fully price-in the economic costs of emitting greenhouse gas (GHG) as well as kick-start the investments that will make the transition to a lower-GHG economy as seamless as possible.

The effort to put a correct price on GHG emissions has so far not moved forward much. But, the economic consequences of more-expensive GHG emissions are simple to forecast, so investments that both directly allow lower levels of GHG emissions as well as giving American households easy ways to transition away from GHG-intensive activities (providing high-quality public transportation options to allow people to drive less, for example) can, and have, moved first.

Efforts in recent years to promote "green jobs" have been a clear success, both in providing a shock absorber to an economy hit by the largest negative shock to private spending since the Great

Depression, as well as in laying a foundation for a cleaner economy in the future. In the testimony that follows, I'll just very quickly discuss some of the evidence supporting this judgment.

Green Jobs and the jobs-crisis

The most ambitious down-payment on green investments for the future in recent years was the portions of the American Recovery and Reinvestment Act (ARRA) that boosted these. Below, I give an overview of the effectiveness of ARRA, drawing largely on previous testimony that I've given.

The ARRA: basic summary

It was noted above that both the Great Recession and the subsequent slow economic recovery were driven by a collapse in private demand for goods and services – a collapse caused by the bursting housing bubble.

The negative shock to private sector spending provided by the housing bubble's burst led to a cascade throughout the economy, negatively impacting consumers, businesses, and exports.

The general case for using fiscal support to stabilize the economy

It's clear that boosting public spending and financing it through increased debt *works* to stabilize economies hit by demand shocks (like the bursting housing bubble). Macroeconomic researchers at Goldman Sachs have noted that the shock to private sector spending caused by the bursting of the housing bubble is actually *larger* than the shock that led to the Great Depression. However, because falling incomes also led to falling tax collections, and because falling incomes and joblessness led to automatic increases in safety net programs like unemployment insurance and food stamps and Medicaid, this led to a purely *mechanical* increase in the federal budget deficit of roughly three-quarters of a *trillion* dollars. These mechanical tax reductions and transfer payments buoyed private households' disposable incomes and acted as a powerful shock absorber against the bursting housing bubble; this is an absolutely key reason why the large initial shock of 2007/2008 did *not* lead to a second Depression.

One testament that rising budget deficits act as a shock absorber against collapsing private sector spending is the fact that essentially *no* professional economist criticized the increase in the budget deficit that arose *before* the passage of the Recovery Act; one can find no professional economist at the time arguing that policy should have kept the budget deficit from rising between January 2008 and February 2009.

The Recovery Act – recognizing that more fiscal support was needed

The Recovery Act represented the correct assessment that the shock absorption provided by the purely *mechanical* rise in the deficit was too small (even when paired with the interest rate cuts undertaken by the Fed) to provide a quick recovery. So, the ARRA was constructed to provide an even larger cushion to the economy. Despite being premised on *exactly the same theory* as the rationale for automatic stabilizers, because it had a clear political sponsor (the Obama Administration) it became flypaper for criticism of all kinds.

One controversy surrounding the Recovery Act concerns the *composition* of the act, with many critics arguing that it was too heavily weighted towards spending at the expense of tax cuts to stimulate the economy. However, only about a third of the Act's appropriations actually funded direct government spending. More than a quarter of the appropriations were for tax cuts (and these were front-loaded, so more than a third of what has been disbursed so far has been tax-cuts) while the remainder went to transfer payments to individuals and states.

<Figure 1 here: Composition of the Recovery Act>

Further, the tax cuts preferred by many of the Act's critics – those going to businesses – were far and away *the least effective* stimulus included in the Act. Tax cuts are less efficient job-creators (especially those not targeted to lower-income households) because they may be saved instead of spent, and because many of the business tax cuts were essentially windfalls (often retroactive) that rewarded activity that would have been done (or had actually already happened) even without the Act.

On the other hand, safety net programs—such as unemployment insurance, nutrition assistance, and health insurance supports– are by definition well-targeted: they go to those families whose incomes have fallen below a threshold or who have recently suffered job loss. Consequently, recipients are much more likely to spend these payments -- they have to. And in terms of making sure that all increases in public debt are spent, infrastructure spending is best of all - none of it can be saved; it all must be spent.

<Figure 2: "Bang-for-buck" from various multipliers for stimulus>

Is infrastructure investment "timely" enough to fight recessions?

Another criticism aimed at the ARRA was that it outlaid money too slowly. Infrastructure investments in general are often criticized for not being "timely" enough to work well as anti-recession measures – the "timely" mantra was one reason, for example, why infrastructure investments were dismissed almost across-the-board by policymakers when the first stimulus package of January 2008 was debated and passed.[3]

Given the length of the Great Recession, and the projected time it will take even from today to reach full-employment, it seems safe to say that this argument can be put to rest: we are in no danger of starting infrastructure programs of any kind that will "miss" the economy's need for more demand.

In regards to ARRA, this criticism of its un-timeliness is particularly ironic given that its boost to economic growth has actually fallen to nearly zero by the last half of 2010 – just as economic growth was decelerating. In short, the substantial boost to the economy from the ARRA has come and gone and the need for more demand remains. This fade-out of ARRA's overall effect happened even as substantial new green investments were still coming on-line and boosting jobs and incomes.

The mechanics behind these two facts - that the ARRA's overall impact is fading while valuable green investments are still coming on-line each day - is simple: the bulk of ARRA's *overall* spending and tax cuts were actually (and contrary to the "untimeliness" charge) quite front-loaded. Many of the tax cuts were largely spent in the first year of its implementation and transfers to state governments and to households were often just a matter of expanding existing programs, so these started boosting purchasing power right away.

By 2011, however, many of these tax-cuts and state-transfers had started to expire (some of the transfers to households also expired, though the largest – the boost to unemployment insurance benefits – has been extended through 2011). Because the rate of spend-out from the ARRA was falling by the last half of 2010, its impact on growth was falling as well.

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[3] It should be noted that not everybody dismissed infrastructure spending as effective stimulus in early 2008 – see Eisenbrey, Irons and Mishel (2008).

However, this falling rate of spend-out would be even greater if the green investments that continue to roll-out each day were not still in the pipeline. While these green investments that continue to come online are not large enough to make up entirely for the massive withdrawal of ARRA's spending on transfers and tax cuts, they *do* still provide a real boost to the economy by cushioning the withdrawal of these other spending categories.

The bottom-line on ARRA after two years

The most contentious political controversy surrounding the ARRA is simply whether or not it helped *at all* to stabilize economic output and create or save jobs. A facile debating technique used by those contending that the Recovery Act did nothing invokes the Obama Administration's (admittedly ill-advised) forecast that the unemployment rate would rise to roughly 9% if the Recovery Act was not passed but would not reach 8% if it was enacted. When unemployment peaked at 10.1% *after* its passage, critics pounced, claiming sometimes that it had even somehow made things worse.

The problem with this interpretation is that it fails to consider the fact that it was not the Recovery Act that failed, but rather the imagination of economic forecasters (both within as well as outside the Obama Administration) about how much damage the collapsing housing bubble would do to the economy.

In short, the difference between an economy with and without the Recovery Act has come in just as advertised: *the economy has between 2-4 million jobs more than it would have had if the Act had not passed.* The underlying trend of the economy, however, was far worse than most forecast. The unemployment rate without the Recovery Act would have reached nearly 12%, not the 9% foreseen by the Obama Administration.

A good metaphor for this controversy is the temperature in a log cabin on a cold winter's night. Say that the weather forecast is for the temperature to reach thirty degrees. To stay warm, you decide to burn three logs in the fireplace. You do the math (and chemistry) and calculate that burning these three logs will generate enough heat to bring the inside of the cabin to fifty degrees – or twenty degrees warmer than the ambient temperature.

But the forecast is wrong – and instead temperatures plummet to ten degrees and burning the logs only results in a cabin temperature of thirty degrees. Has log-burning failed as a strategy to generate heat? Of course not. Has your estimate of the effectiveness of log-burning been wildly wrong? Nope – it was exactly right – it added twenty degrees to the ambient temperature. The only lesson from this is a simple one: since the weather turned out worse than expected you need more logs.

Evidence on ARRA's impact

What is often unappreciated in public debate is that the perspective that the ARRA worked as advertised to create 2-4 million jobs is the essential *consensus* among economic forecasters, both private and public. In short, for those whose salary depends on knowing what moves the economy from quarter to quarter, there is unanimity that the Act saved or created millions of jobs.

<Figures 3—5 here: effect of the Recovery Act on GDP, jobs, and unemployment>

There are a number of factors that explain the near-unanimity among forecasters who have examined the impact of ARRA.

First, it is firmly in line with what mainstream economic theory teaches is the likely effect of deficit-financed tax cuts, transfers and spending in an economy that has high unemployment even in the presence of rock-bottom interest rates (i.e., is in a liquidity trap). The effect of increasing deficits to finance tax cuts, transfers and spending in a *healthy* economy is ambiguous and there are many complications to assessing it. However, in a liquidity trap these complications fade away and the impact of these policy maneuvers become quite straightforward; they unambiguously push the economy closer to its potential, lowering the unemployment rate.

Second, the timing of the Recovery Act coincides perfectly with the halt in the downward spiral of both economic output and employment.[2] In the 6 months before the Act began paying out funds, gross domestic product *contracted* at a -5.9% annualized rate while in the 6 months after its passage the economy *grew* at a 0.75% annualized rate.

In the 6 months before the Recovery Act took effect, average monthly employment declined by over 700,000 while in the 6 months after its passage these declines fell nearly in half, to 369,000. In the second 6 months of the year following its passage average employment was roughly stable – and began growing consistently thereafter.[3]

<Figure 6 here: growth in GDP and employment pre/post ARRA>

Green Jobs, the infrastructure deficit, and climate change

Ample evidence exists arguing that there is a large deficit in needed physical infrastructure investments in the U.S. economy. Further, the threat of global climate change argues for significant resources to be spent to mitigate carbon emissions and put the economy on a low-carbon track in decades to come.

The more front-loaded these investment efforts are, the better it is for an American economy that looks saddled with a high unemployment rate for years to come. But, even after the jobs-crisis inflicted by the Great Recession recedes, the case for public investment on its own terms remains strong and needs to be accommodated in our nation's budgeting. Any plan to reduce the deficit that does not accommodate this needed improvement in the public capital stock is *economically* irresponsible.

Evidence on public investment and growth

A substantial economic literature exists that attempts to quantify the growth benefits of public investment. This literature was almost single-handedly sparked by David Aschauer's work in the late 1980s and early 1990s. Aschauer (1989a,b,c and 1990)provided copious evidence supporting the view that more than half of the rapid decline in productivity-growth that began in 1973 and persisted through 1995 could be attributed to slowing *public* investment.

Aschauer essentially used national-level data and ran regressions using changes in the public capital stock (often disaggregated by type) as an explanatory variable and various outcome measures (productivity growth, productivity growth in the private sector, the return to private sector investments) as independent variables. He found a large and significant positive relationship between growth in the public capital stock and in these private sector output variables.

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[2] In what follows I date the effect of the Recovery Act as beginning April 1, 2009. While it was passed in late February and some money was spent before this, April 2009 is the first month that saw significant amounts of money being spent.

[3] While there were months with job-losses in the second half of the year following ARRA's passage, these were mostly attributable to layoffs occurring due to the end of the decennial census – private sector employment has grown consistently since January 2010.

Separately, Munnell (1990a,b and 1992) began pursuing a related research agenda. She also looked at national, time-series relationships between changes in the public capital stock and private-sector productivity growth and returns to capital, finding a significant and positive relationship.

Both the Aschauer and Munnell work demonstrated that public investment was in fact more likely to crowd-in private investment than to crowd it out. And both suggested that the declining rate of public investment was a prime culprit in explaining the producitivity growth slowdown that began in the early 1970s.

A criticism of these initial studies was that their relatively simple time-series orientation led them to pick up spurious trends in their explanatory and independent variables. As neither public capital stock growth nor productivity growth is "stationary" – meaning that their average (and variance) change over time – then a simple regression relating one to the other might just be picking up a common, but non-causal, trend affecting both. The critics further argued that when the relevant series were "de-trended" (usually by first-differencing) the strong relationships between public investment and private sector growth outcomes were greatly weakened.

While the criticisms of the earlier Aschauer and Munnell work had some merit, the proposed solutions did not, so the conclusions drawn from de-trending should be rejected. Nobody really argues that there should be an *immediate* short-run relationship between public investment in, say the first quarter of 2009 and productivity growth in that same quarter. De-trending the series by definition removes the possibility of finding the kind of long-run equilibrium relationship between public investment and growth that the theory calls for and instead can only capture short-run adjustments of private-sector growth to public capital.

More importantly, consequent research that explicitly dealt with some of the criticisms of the first round of public investment research re-established strong findings that public investment aids growth – both total and even *private-sector* growth.

For example, when researchers, like Munnell (1992), examined variations across regions and states, they likewise found a durable link between public investment and productivity growth. While some researchers argued that this link was weakened by the inclusion of state fixed effects, Shioji (2001) has found positive and significant effects of public investment even when including these fixed effects. John Fernald's (1999) work looks at the effect of targeted public investments (say improvements in roads and highways) on the productivity of industries most likely to benefit from a higher-quality public capital stock (trucking in the case of highway improvements) and found that this was indeed the case – public capital improvements led to significant increases in the private sector industries most likely to be affected by them.

James Heintz (2010) has undertaken the most recent re-working of Aschauer's national-level results, incorporating and correcting many of the criticisms made of the original papers. He finds, after using up-to-date data and addressing the statistical issues raised in the earlier rounds of the debate, that the public capital and growth link may even be stronger than originally identified by Aschauer.

Further, one of the greatest challenges facing the U.S. and world economies going forward is global climate change. As a pure public *bad* (as opposed to public good) – climate change is completely non-rival and non-excludable. This argues that carbon mitigation to stop (or at least slow-down) climate change is a global public good and hence a prime candidate for addressing (at least partially) through public investments. Numerous economic studies have pointed to a large economic payoff from undertaking such a campaign to limit GHG emissions – and even these have generally not considered the considerable insurance value of making truly catastrophic outcomes of climate change much less likely in the future.

Responses to some quick objections about "green jobs"

There are a number of objections often raised about efforts to expand "green jobs". This section will just answer three of them quickly.

What exactly are "green jobs"

There is no standard definition. But, I think the definition that makes sense is to look at today's economy, and then look at the economy we need to have in order to produce cleaner energy and fight GHG emissions. A cleaner economy will burn less coal, will see investments in pollution mitigation, and will see some job-categories like bus drivers increase their share of overall employment because demand for low-emissions alternative like public transportation are likely to rise.

Job-categories that are needed to build the clean-energy infrastructure are clearly green, but so are the job-categories that have a larger weight in overall employment as a consequence of the move to a clean-energy economy.

Even if fiscal support and physical infrastructure projects are good, why do they have to be 'green'?

Fiscal support would "work" in short-run no matter what the money was spent on – spending money is the point. But, given that there is money to be spent, it makes sense to direct the spending on projects that will improve the long-run growth position of the U.S. economy. We know a couple of things about this long-run – countries around the world look to be moving towards lower-GHG activities and are investing enormous amounts in manufacturing goods that will be the foundation of this lower-GHG economy. Yet, because policy has still provided a clear signal on what the price of GHG emissions are going to be, private actors are still loathe to commit to money. Further, we know that a lower-GHG economy will demand many complementary public investments – high-quality public transportation for example. In short, making sure that a significant portion of the fiscal support we provide to the ailing economy also supports green investments seems like a clearly appropriate thing to do.

Don't we have to worry about the debt?

As hard as it is to hear for people steeped in a Beltway culture that has used fear of deficits to fight every policy change they don't like (be it spending increases or tax cuts), deficit fears just don't apply to green invesments, either in the short or the longer-term.

Short-term

In the short-term, no increase in fiscal support need worry us in regards to debt. The most well-pedigreed argument against increasing budget deficits in healthy economies is the fear that increased government borrowing causes interest rates to rise as public demand competes with private demand for fixed savings of households and businesses. These rising interest rates spurred by growing deficits results in private investment "crowding out" private capital formation and the lower value of the private capital stock leads to lower future growth. When economic commentators make arguments disparaging the ability of the Recovery Act (or government spending of any kind) to create jobs, they generally make variants of this crowding-out argument.

The general failure of interest rates to rise in response to the increase in budget deficits, and to the Recovery Act in particular, is a prime piece of evidence that no crowding out of private investment is occurring, making the Recovery Act not just cheap, but essentially free in terms of its overall economic opportunity cost.[6] This is, again, not unexpected. Economic theory teaches that increased public borrowing during a liquidity trap does not crowd-out private sector activity.

<Figure 7 here: Long-term real interest rates>

Long-term

In the long-term, if the economy recovers and begins allow for rates of joblessness much closer to historic norms during economic expansions, then fears of budget deficits putting upward pressure on interest rates may be better-founded. Yet, even this does not argue against green investments.

The way that rising interest rates harm the economy is by "crowding out" private sector spending and reducing the private capital stock. But, if deficits are incurred through public investments, then the overall level of the nation's capital stock is unchanged, and just its composition is changed. And so long as the public investments have rates of return as high as the rate of risk-free Treasury bonds, then it is economically correct to undertake them. Given what the evidence tells us about the return to public sector investments, and given that we know that public investments have lagged private investments for some time, it seems clear that an increase in investments meant to close the infrastructure gap and fight global climate change will be very high-return indeed.

Conclusion

Every serious effort to evaluate the impact of ARRA has indicated that it worked as advertised: the US economy would have 2-4 million fewer jobs today and would be hundreds of billions of dollars poorer had it not been passed.

Yet, as of December 2010 the U.S. economy still needs 11 million jobs to return the unemployment to its pre-recession level. Clearly more fiscal support is needed.

Given this need, it seems obvious that a smart policy-path to go down would be to extend those parts of ARRA that are most effective in spurring growth and employment in the near-term.

Even better, unlike some other forms of economic stimulus, if by some chance there is a miraculous economic recovery that leads to very low rates of unemployment very soon, additional green investments undertaken in coming years would not, *even if they are debt-financed*, "crowd-out" other investments and lead to a smaller economy-wide capital stock. That is, while the case for doing green investments now is made stronger by the fact that these investments will provide jobs to an economy presently starved of them, the case for these investments is still strong even if the economy does not need the jobs (a very unlikely possibility).

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[6] There is an additional channel through which increasing federal budget deficits in a healthy economy can lead to slower domestic income growth – if the increased borrowing spurred by them leads to greater borrowing from foreign investors. Very few (if any) detractors of the Recovery Act have made the argument that this has happened – and correctly so. The mechanism for this channel to work would have to be a rise in the trade deficit. But, the trade deficit fell significantly over the course of this recession.

In short, the greatest short-term challenge facing the U.S. economy is finding enough work for the 25 million Americans that are either un- or under-employed while the greatest long-term challenge facing the U.S. *and* global economies is constructing a smooth transition to much less carbon-intensive forms of production. Investments in the green economy help ameliorate both challenges. Not undertaking them would be madness.

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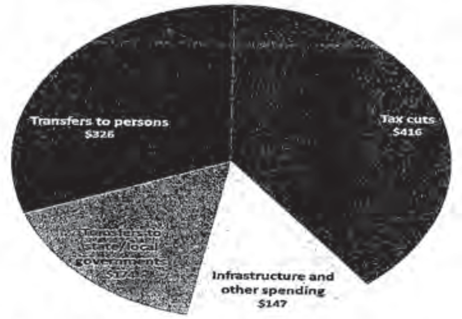
Figure 1

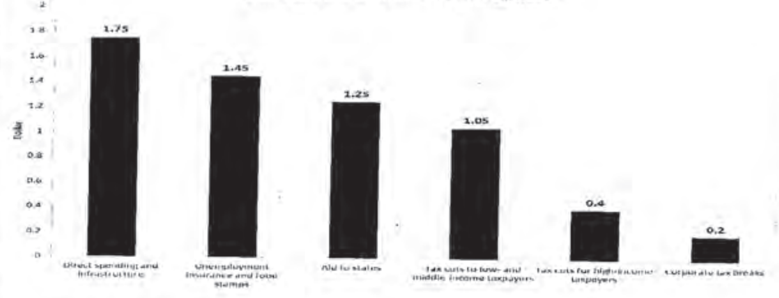
Fiscal stimulus in the 2007 recession: Where did it go?
(Billions of dollars)



Source: Blinder and Zandi (2010)

Figure 2

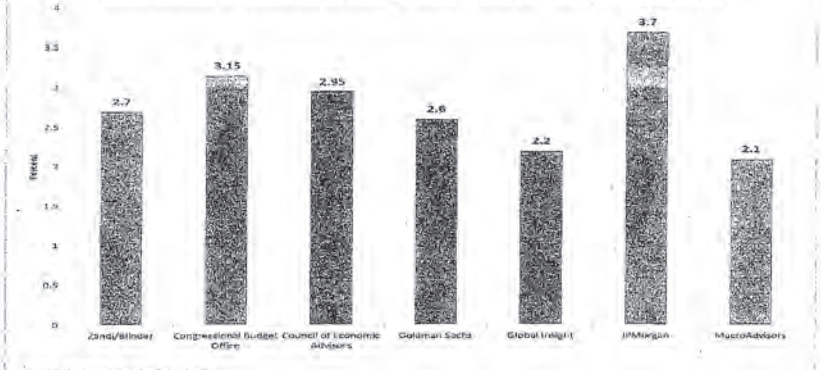
"Bang for buck" stimulus multipliers



Source: Congressional Budget Office data.

Figure 3

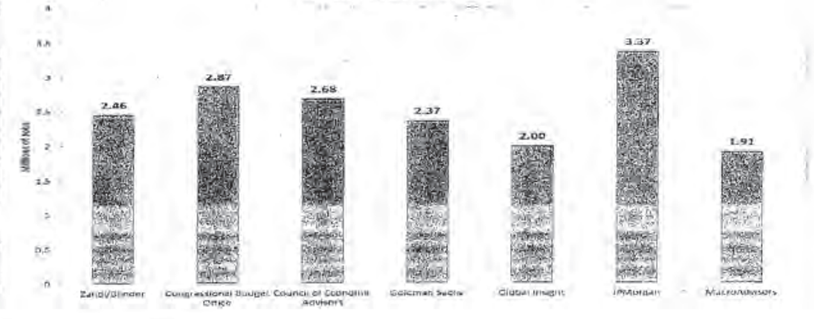
Contribution of stimulus to GDP growth in the second quarter of 2010



Source: Data from sources listed above.

Figure 4

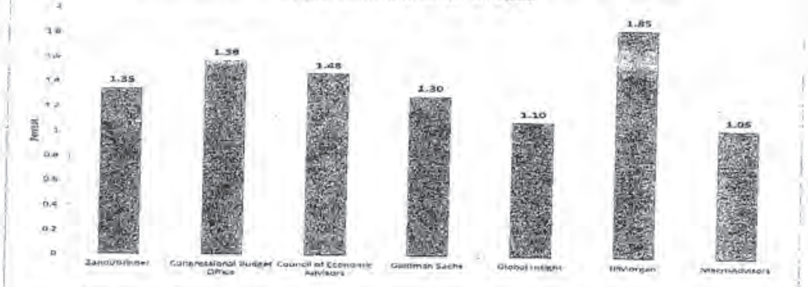
Contribution of stimulus to employment growth in the second quarter of 2010



Source: Data from sources listed above.

Figure 5

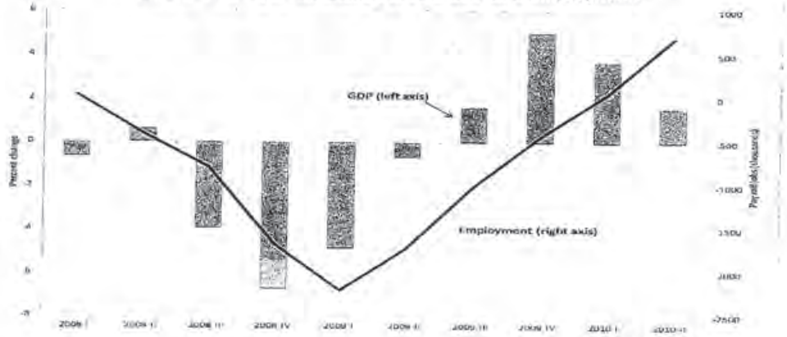
Percentage point decrease in unemployment rate due to stimulus in the second quarter of 2010



Source: Data from sources listed above.

Figure 6

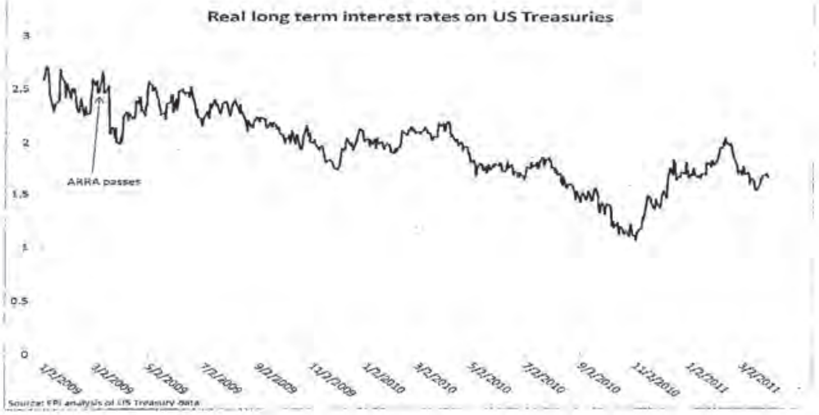
Quarter-over-quarter change in real GDP and employment



Source: EPI analysis of Bureau of Labor Statistics data and Bureau of Economic Analysis data.

Figure 7

Real long term interest rates on US Treasuries



Source: EPI analysis of US Treasury data

Chairman BROUN. Thank you, Dr. Bivens.

Our next witness is Dr. David Montgomery with NERA Economic Consulting. I recognize you for five minutes, sir.

STATEMENT OF DR. DAVID W. MONTGOMERY, VICE PRESIDENT, NERA ECONOMIC CONSULTING

Mr. MONTGOMERY. Thank you, Chairman Broun and Ranking Member Edwards. I am honored, again, by your invitation to appear before the subcommittee.

I have recently joined NERA Economic Consulting as a Senior Vice President, but today I am testifying entirely on my own behalf. These are my own independent opinions and conclusions, do not necessarily represent the positions of my employer or any of its clients.

I have two primary recommendations. First, stop using green technology as an engine of macro-economic policy. That approach takes resources away from R&D that could lead to fundamental technology advances, it increases the cost of meeting environmental goals, and it is inferior macro-economic policy as well.

Second, take some of the resources now being spent unnecessarily on demonstration and deployment and put them to work cushioning real research and the onset of the inevitable and necessary era of fiscal austerity.

It would also be helpful to create new institutional arrangement to assure continuity of energy R&D funding and prevent that funding from being starved in the future by the huge budgetary demands of large-scale demonstrations of unready or excessively costly technologies.

As you consider reductions in spending it is critically important to preserve the current levels of funding for basic and applied energy research. All the rest of the direct funding, subsidies, loan guarantees, and standards to promote large-scale technology, demonstration, and deployment need to be examined critically because most can go without sacrificing either environmental goals or—and at a great saving to the taxpayer.

Why are reductions in basic research so harmful? It is not possible to get the best science and technological advances with stop, go, stop funding. Good researchers will not tolerate being torqued around. They will go back to fields of research where that does not happen, and the flow of discovery that is required for breakthrough applications will stop.

And why can reducing direct support for green energy be so beneficial? That support is a solution in search of a problem. Cost-effective environmental programs apply directly to the emissions that cause harm. That is what we environmental economists have been trying to teach our students at least for the 30 years I have been in the game. Tilting the playing field to favor specific technologies only forces American industry to adopt more costly ways of meeting the requirements of environmental laws and regulations.

There is already every incentive for industry to choose the most cost-effective means to meet those requirements, and I cannot understand how we now think that energy is a public good since it has been provided cost effectively by the private sector for centuries.

The only virtue green technologies can claim is superior performance and identifiable environmental dimensions. So environmental programs, not technology subsidies and mandates, should guide their adoption. In some specific cases particular kinds of support for technology demonstration might be justified.

But history and economics make it clear that these are the exceptions, and allowing the exceptions also opens the door to a flood of rent-seeking pleas for support and earmarks.

Government funding for basic and applied research is still needed to provide the flow of discoveries on which cleaner and cheaper technologies will be based. Every prior—unfortunately, every prior Congress that has been faced with the choice has sacrificed the unquestioned long-term benefits of R&D to maintain jobs through fundamentally-unnecessary and wasteful subsidies for existing technologies.

I urge you to change that dismal record.

I haven't used up much of my time. I would be happy in the future to debate some points of macro-economic policy, but I wanted to focus on R&D.

Thank you.

[The prepared statement of Mr. Montgomery follows:]

PREPARED STATEMENT OF DR. DAVID W. MONTGOMERY, VICE PRESIDENT, NERA ECONOMIC CONSULTING

Mr. Chairman and Members of the Subcommittee:

I am honored by your invitation to testify today. I am an economist and have recently joined NERA Economic Consulting as Senior Vice President. I will start with a brief word about my qualifications.

I have studied energy R&D and energy technology programs since the late 1 970s, when as a member of the faculty at Caltech I participated in a major study of the economics of R&D supported by the National Science Foundation. More recently I was coauthor of a statement of principles for energy R&D policy with some of the most distinguished academic experts in the field. At the Congressional Budget Office I was deeply involved in all the issues of this hearing, as my Natural Resource and Commerce Division was continuously active in analyzing Federal R&D programs and industrial policy. I have published many papers in peer-reviewed journals on related subjects, and I was honored by the Association of Environmental and Resource

Economists with their 2004 award for a "publication of enduring quality" for my pioneering work on emission trading. I taught environmental economics at the California Institute of Technology and economic theory at Caltech and Stanford University. I was Assistant Director for Natural Resources and Commerce at CBO and until recently I led the group at Charles River

Associates that developed a pioneering set of economic models and used them in studies of virtually every major proposal for climate and energy policies over the past decade.

My testimony today will take a broad view of the subject. I will address the common-sense economics of federal efforts to create green jobs through federal R&D funding and through the use of loan guarantees, standards, subsidies, regulations, and tax incentives to promote "green" technologies. My statements in this testimony represent my own opinions and conclusions and do not necessarily represent positions of my employer or any of its clients . . .

Summary

It is a fundamental error in policymaking and economics to design or justify federal support for new energy technologies as a jobs program. It subverts the entire purpose of government involvement in R&D, and is the greatest single cause of the continued failure of energy technology programs.

Some advocates claim that Federal spending on green technologies is a "triple winner;" instead, it is at best a "triple also-ran." [1] No single policy tool can at the same time and in a cost effective way develop new energy sources, protect the environment, and reduce cyclical employment. A closer look shows that current efforts to do these three things at once must, lead to doing none of them well or even adequately.

1. *Promoting new energy technology*: The federal government has a limited but vital role in the quest for new energy technology. But the right division of labor between public sector and private sector is absolutely crucial to success. Government should focus on basic and applied research. There, its intervention is essential; yet it is in these activities that the U.S. government traditionally allocates the smallest part of the Energy R&D budget. The policies promoting use of current green technology starve needed research in favor of demonstration and deployment of high cost current technology. The stimulus package tilted the balance still farther in the wrong direction.
2. *Cost-effective environmental protection*: Current programs to promote a Green economy actually raise the costs of reaching environmental goals. Well-designed environmental policies would provide incentives to choose least-cost means of compliance. In contrast, current green jobs policies mandate use of specific technologies; yet these may often not be the most cost-effective means to the desired end. Some current policies even use subsidies to tilt the playing field. If such schemes work at all, they do so by encouraging the choice of needlessly costly means while shifting the added costs onto the taxpayers.
3. *Stimulus*: To be efficient, energy R&D and investment incentives must be predictable, consistent, and sustained over a long period of time. But in a recession, fiscal policy experts all agree that the most effective jobs program spends its funds as quickly as possible and phases out the funding as the economy improves. Thus, energy research and investment are strikingly ill-suited to the task of leading the economy out of a down turn. The attempt to force these activities into so inapt a role is bound to frustrate the goals of both energy policy and economic stimulus.

Purposes of government intervention:

Efforts to use government spending to create "Green" jobs lose sight of the real objectives of government intervention in energy technology and R&D. Economists call these reasons "externalities," but they can be viewed simply as the problems that government intervention is designed to solve. There are two areas in which markets cannot be expected to bring about the most socially desirable outcomes without some fonn of government intervention, and these are R&D and environmental protection. There is less complete agreement among economists about the appropriate role of government in dealing with the business cycle, but for my testimony today I will assume that a third policy goal, more rapid recovery from the recession, is also relevant. The **current mix of subsidies** for technology deployment through the use of loan guarantees, standards, subsidies, regulations, and tax incentives has only a haphazard relationship to these three externalities, and cannot do a good job of dealing with any of them.

R&D

Government must play a role in R&D because it is impossible for researchers and innovators to capture for themselves the full value of the information that their activities provide to society.This spillover effect is a positive externality, but it also implies that without active government intervention there will be less R&D than is socially optimal. The market failures associated withR&D are greatest in the early stages of basic and applied research: as activity moves into demonstration of technologies and their commercial deployment there are increasingly effective ways to protect intellectual property—including patents, trade secrets, and in-house development— for innovators and investors to appropriate an adequate share of the gains their innovations provide to society. Thus government's role should be greatest in funding of basic and applied research and fade away as projects move toward large scale demonstration. [2]

In all sectors of the economy except energy, U.S. government funding is concentrated in basic and applied research as theory and experience demonstrates that it should be. Energy R&D programs tend to take too few risks, because they concentrate funding on pre-selected potential “winners” that are carried forward long after they have ceased to warrant continued government support. In large part, these failings can be directly attributed to the widespread perception of energy technology funding as a “jobs” program.

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[1] Jason Walsh, Josh Bivens and Ethan Pollack Rebuilding Green The American Recovery and Reinvestment Act and the Green Economy, Blue-Green Alliance and Economic Policy Institute, February 2011.

[2] In support of this point, see Richard Newell, A U.S. Innovation Strategy for Climate Change Mitigation. The Brookings Institution Discussion Paper 2008–15 December 2008 p. 20 ff.

A statement written by a number of the most distinguished experts in the economics of R&D described the kinds of policies that would be effective in promoting technological advances in energy: [3]

> Government R&D policy should encourage more risk-taking and tolerate failures that could provide valuable information. This can be accomplished by adopting parallel project funding and management strategies and by shifting the mix of R&D investment towards more “exploratory” R&D that is characterized by greater uncertainty in the distribution of project payoffs. The single greatest impediment to an R&D program that is directed at achieving a commercial objective is that it will be distorted to deliver subsidies to favored firms, industries, and other organized interests. The best institutional protections for minimizing these distortions are multiyear appropriations, agency independence in making grants, use of peer review with clear criteria for project selection, and payments based on progress and outputs rather than cost recovery.

The idea of parallel approaches is very important, and as I will discuss later it is rarely seen in Federal energy R&D. Studies of successful R&D show that a parallel approach, in which many early-stage, high-risk projects are funded with the expectation that most will fail, would be provide far more information than the current approach, and would increase the likelihood of breakthrough discoveries.

The statement also emphasized that commitments must be long-term and stable:

> Policy commitments must be stable over long periods of time. Climate change is a longrun problem and will not be solved by transitory programs aiming at harvesting available short-run improvements in energy efficiency or low-carbon energy. A much more stable commitment to funding and incentives for R&D is required to do better than the limited results of energy R&D efforts in the 1970s and 80s.

What should be equally clear is that a series of temporary, politically unstable, targeted subsidies, financial incentives, or even mandates for deploying specific green technologies will not provide adequate incentives for the R&D that would bring about large-scale technological change.

Environmental and other externalities of energy production and use

Another rationale for energy R&D comes from externalities associated with energy production and use. Effective programs to address these externalities—such as the Clean Air Act Title IV program that through a cap and trade program put a price on sulfur emissions from utilities—created clear incentives for the private sector to develop and deploy new control technologies. One of the few things that most economists agree on is that a clear, credible, consistent and stable policy that puts a price on C02 emissions will lead to cost-effective technology deployment and provide a demand-driven inducement to innovation. Federal support for energy R&D motivated by these externalities also needs to be concentrated on basic and applied research, as existing environmental regulations and new policies focused on the direct causes of environmental concern—such as greenhouse gas problems—provide the incentives for innovators to take these research findings into commercial demonstration and deployment.

Even energy security is dealt with most efficiently by programs that directly increase domestic production of crude oil and reduce consumption oil consumption in a balanced way. The ideal in terms of cost-effectiveness is an import fee, not a set of targeted subsidies and mandates for costly or technologically unavailable substitutes for oil. [4] Production of more fossil fuels is a direct and—on an appropriate scale—more cost-effective way to reduce oil imports than promotion of non-petroleum fuels through regulation (Renewable Fuels Standards) or subsidies (ethanol).

Many of the environmental consequences of energy production and use are already extensively regulated. Greenhouse gas emissions have not been regulated until now, but are the subject of proposed EPA regulations and much legislation. Development of new—and indeed radically new—energy technologies is critical to our ability to reduce greenhouse gas emissions sufficiently to stabilize temperatures at some level without unacceptable economic harm. For other externalities, this is less clear. Development of new technologies for production and use of fossil fuels or other forms of energy is already motivated by a perceived need for more cost-effective options for compliance with policies that address other externalities.

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[3] “A Statement on the Appropriate Role for Research and Development in Climate Policy” Kenneth J. Arrow, Linda Cohen, Paul A. David, Robert W. Hahn, Charles D. Kolstad, Lee Lane, W. David Montgomery, Richard R. Nelson, Roger G. Noll and Anne E. Smith. Economists Voice, February 2009, Vol 6, No. i.

[4] D. Bohi and W. D. Montgomery. Oil Prices, Energy Security, and Import Policy. With Washington, DC: Resources forthe Future, 1982.

Recovery

Recovery from the recession is a policy problem distinct from either R&D or energy externalities, and requires its own distinct toolkit. Economists differ seriously about the best strategy to pursue to address an economic downturn like the one we have faced. All agree that monetary policy in some form is necessary, but many are critical of using government spending to stimulate the economy because of the long-term consequences of increased debt and the difficulty of making the spending be effective and timely. Too often fiscal measures are so slow to get money into the economy that they only ramp up funding after the economy is well on its way to recovery, so that rather than reducing unemployment deficit spending ends up increasing inflationary pressures. Moreover, temporary stimulus programs create constituencies that lobby to keep the spending going long after stimulus is no longer needed.

The basic principles of public finance for reducing cyclical unemployment are to choose methods of spending that get money into the economy as quickly as possible. Public works projects that have already been chosen as desirable investments by passing through the authorization process are good candidates. But the projects must be ones that can be ramped up quickly and also ramped down without waste or diminishing their value or effectiveness. Technology development that requires this kind of long term and stable funding does not satisfy these criteria.

Another basic principle is that the stimulus comes from spending, and many different programs offer the same opportunity for job creation if they receive the money. Thus job creation does not serve to justify one form of spending over another. Choosing which among many competing uses of funds should be the recipient of stimulus funding is not different from normal authorization and appropriations, except for the need for speed to avoid missing the window when stimulus is needed. A program that cannot pass a normal cost-benefit test has no business being chosen as a recipient of stimulus funding.

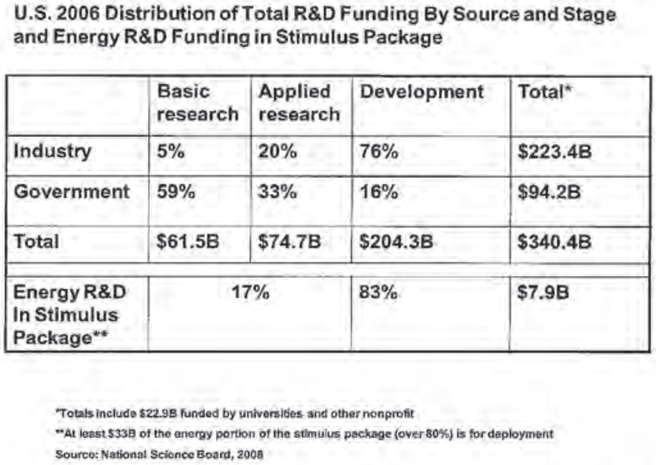
Why Energy R&D and Green Economy programs achieve none of the policy goals well

There is no such thing as a "triple winner" in economic policy. Economists have long observed that as many different instruments are required as there are distinct externalities. Using one policy instrument to address three different market failures assures that none will be addressed well or cost-effectively.

Energy R&D failures are largely attributable to an inability to resist treating technology investment as a jobs program

R&D is carried out by governments, for-profit and not-for-profit entities, and national and multinational institutions. These institutions perform a wide variety of R&D as illustrated in Table 1. This suggests that the problem of appropriability is greatest in basic research, important in applied research, and smaller in development and later stages of demonstration, commercialization and deployment.

Perhaps the most striking feature of the government's energy spending is the relatively low priority that it accords to R&D in general and basic and applied research in particular. In fact, in terms of total spending, deployment subsidies dominate. The following figure shows the relative resource commitments and the relatively modest role of basic and applied research in the Federal program. Thus even before the stimulus package, Federal funding was highly biased toward development where the private sector is capable of handling a much larger role if the technologies being advanced to that state promise to be commercially successful. Federal funding for this stage has been needed largely because too many unpromising technologies are advanced beyond basic and applied research.



U.S. 2006 Distribution of Total R&D Funding By Source and Stage and Energy R&D Funding in Stimulus Package

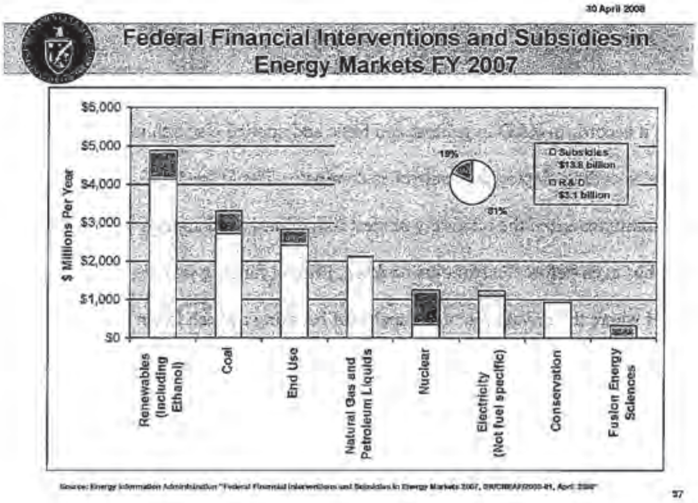
	Basic research	Applied research	Development	Total*
Industry	5%	20%	76%	$223.4B
Government	59%	33%	16%	$94.2B
Total	$61.5B	$74.7B	$204.3B	$340.4B
Energy R&D In Stimulus Package**	17%		83%	$7.9B

*Totals include $22.9B funded by universities and other nonprofit

**At least $33B of the energy portion of the stimulus package (over 80%) is for deployment

Source: National Science Board, 2008

Demonstration and deployment subsidies tilt the balance further away from basic and applied research:



30 April 2008

Federal Financial Interventions and Subsidies in Energy Markets FY 2007

Source: Energy Information Administration "Federal Financial Interventions and Subsidies in Energy Markets 2007, SR/CNEAF/2008-01, April 2008"

37

These funding patterns can be attributed to three serious failings in the total energy technology program:

> Large scale demonstration projects that provide "jobs" in politically influential regions drain funds from basic and applied research,
>
> Deployment subsidies that benefit specific constituencies are rationalized as creating "jobs" even if the technologies are not cost-effective, and
>
> Failing projects are not cancelled because of the "jobs" involved.

And each of these failings arises because of favoring jobs" over the most effective way of promoting technological advance.

It is not surprising, therefore, that energy R&D had a long history of waste and failure. Cohen and Noll describe a dynamic based on incentives of executive agency staff and Congressional incumbents that leads to the conclusion that R&D programs will investigate too few risky alternatives in the early stages of research, commit prematurely to large scale demonstration, and continue to fund large scale projects long after their failure has become evident.[5] This is exactly the opposite of the stable, long-term research program required to stimulate breakthrough research and introduce game-changing technologies.

Newell, in the study cited earlier, expands on this point:

> A number of specific market problems have been suggested as rationales for technology deployment policies. These market problems include information problems related to energy-efficiency investment decisions, knowledge spillovers from learning during deployment, asymmetric information between project developers and lenders, network effects in large integrated systems, and incomplete insurance markets for liability associated with specific technologies (Newell 2007b). Although such problems are often cited in justifying deployment policies, these policies in practice often go much farther in promoting particular technologies than a response to a legitimate market problem would require. Therefore, while conceptually sound rationales may exist for implementing these policies in specific circumstances, economists and others tend to be skeptical that many of them, as actually proposed and implemented, would provide a cost-effective addition to market-based emissions policies. Critics also point out deployment policies intended to last only during the early stages of commercialization and deployment often create vested interests that make the policies difficult to end .
>
> . . . the most notable failures in government energy R&D funding (e.g., the Synthetic Fuels Corporation, Clinch River Breeder Reactor) tend to be associated with large-scale demonstration projects-using up large portions of limited R&D budgets in the process (Cohen and Noll 1991). The recent experience with the FutureGen Initiative for clean-coal power tends to reinforce this perspective.[6]

The nature of the electoral process biases authorization and appropriation processes against basic and applied energy research. Supporting R&D projects that yield large, but diffuse, net benefits and those only after a long time, is a poor re-election strategy. However, when an R&D project reaches a large enough scale, it begins to have distributive significance. At that stage, the project may become politically relevant to legislators interested in re-election (Cohen et al 1991).

Energy R&D managers also exhibit an unwillingness to propose a sufficiently wide range of risky alternative approaches to achieve real breakthroughs. High-risk approaches with high potential may not come to their attention, since in the early stage of R&D there are significant agency problems in communicating the nature and potential of an approach (Cohen et al 1991).

Career advancement is also more likely to come from successful projects rather than accumulation of useful information about approaches that do not work. This limits the set of alternatives considered for funding and leads to far too little risk-taking in government R&D and too narrow a view of possible avenues of approach.

This dynamic introduces a series of perverse incentives.

First, it encourages officials to move technologies too swiftly to the phase of large-scale demonstration. As a result, these projects often run into technical problems that could have been resolved much more cost-effectively at a smaller scale, and to end up having chosen the wrong route overall.

Second, congressional involvement has often led to poor projects surviving long after they should have been terminated. Representatives gain electoral credit for continued funding of local facilities and lose almost no electoral credit because the funding is accomplishing nothing.

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[5] Linda R. Cohen, and Roger G. Noll (With Jeffrey S. Banks, Susan A. Edelman, and William M. Pegram). The Technology Pork Barrel. Washington, D.C.: The Brookings Institution, 1991.

[6] Newell, ibid.

Third, the excess resources that demonstration projects consume, either because they are launched prematurely or because they linger too long on political life support, are likely to crowd out more valuable earlier phase research. In effect, projects at the early stage of development are not politically appealing because further work on them is not expensive enough to have distributive significance.

Fourth, the rush to demonstration may distort the selection of technologies toward those that are more mature rather than toward those that are more promising. Where there is path dependency in technology selection such distortions may have long-term consequences.

In addition to the effects of the high political discount rate on a premature rush to demonstration at high cost, choosing the location and design of projects by earmarking to benefit influential constituents is unlikely to lead to the choice of the best qualified and most cost-effective organization to carry out an R&D project.

All of these characteristics are found in the expanded set of programs that were introduced in the stimulus package and are rationalized as a program to create a “Green Economy.” The history of energy R&D suggests that they will not promote technological advance effectively and that they will lead to waste of taxpayer’s resources.

Green energy subsidies raise the cost of environmental policy

Cost-effective environmental policies lead to a choice of technologies that achieve the goals of the policies at minimum cost. A price on pollution -like the price of sulfur or NOx allowances—motivates every emitter to choose methods of reducing emissions that cost less per ton removed than the price of allowances. With a fixed cap on emissions, the allowance market causes the price of allowances to adjust until sufficient investments are made in pollution control that the cap is achieved. Introducing mandates for specific “Green” solutions, such as a Renewable

Portfolio Standard or credits for manufacturing renewable energy equipment, only forces utilities to choose more costly renewable energy technologies over less costly solutions, because the cap will be met in either case.

A performance-based emission standard does not achieve the broad cost-minimization that an emission trading system would do, but it does provide an incentive for regulated entities to choose the method of compliance with the standard that minimizes cost. A good example is the reformulated gasoline standard, which allows flexible choice of fuel components as long as the required emission performance is achieved. Adding a set of renewable fuel standards on top of the reformulated gasoline emission standards only increases the cost of meeting the emission standards, because the renewable fuel standards require that gasoline already compliant with emission standards be replaced with a much more costly alternative fuel that in some cases actually makes compliance with the emission standard more difficult.

This is a general phenomenon. Regulations or incentives that deal directly with the emissions, or more generally the externality, in question are always more cost-effective than incentives or subsidies that tilt the playing field in favor of one set of technologies that would not have been chosen as an environmental solution without the subsidies. And the cost is absorbed by the taxpayer.

Energy R&D and technology investment have none of the characteristics of the optimal policy to create jobs in a recession

First, they ignore the timing of proposed policies relative to the business cycle. One of the first principles of fiscal policy to counter recessions is to make sure that funds are expended quickly, and the most common political mistake is to authorize spending that will only hit its peak after the economy is well on the way to recovery. That mistake in timing means that the opportunity to help the economy out of the recession is missed, and that when spending does occur it fuels inflation and drives out other, more productive investments. Current regulatory programs and subsidies and loan guarantees for green technology fail this test. Even if some spending in these programs did ramp up quickly, most of the expenditures would still largely be made after even pessimists think the economy will be well on the way to recovery. In that case, workers supported by green technology subsidies will have to be drawn away from other jobs, just as the mandated investment will be drawn away from other areas where it would contribute to economic growth. The total result is no net job gain and an overall drag on the economy.

Even if the expenditures for green technology were timely, they cannot take credit for the benefits of economic stimulus. As even Green Jobs advocates admit, about the same job benefits can be expected to come from any additional stimulus spending, so that job benefits do not differentiate between different kinds of spending. This kind of job analysis is a sheer waste of time and resources, because every proposal for more expenditure can make identical claims. In a slack economy, any increase in spending will create some jobs. The way to get the most out of fiscal stimulus is by putting additional spending into the areas in which a temporary funding increase provides the greatest return to the economy overall, and that does not include R&D or investment that requires stable and permanent incentives.

Conclusion: What About the Green Economy

There are serious reasons of public policy for federal support of basic and applied research that could lead to breakthroughs in energy technology and for policies that deal with environmental protection and global climate change. Very specific kinds of measures are appropriate for each.

Federal R&D funding deals with the market failure in R&D that leads to less than optimal R&D effort across the board in the economy. Programs like Title IV sulfur trading deal cost-effectively with SOx emissions, and a carbon tax could address greenhouse gas emissions at lower cost than any set of subsidies and standards. But even the best-designed regulatory , programs have costs, as I have discussed in four previous appearances before House and Senate Committees in the past two months. They do not create additional jobs for the economy as a whole, but they do raise energy costs and lower worker compensation and the standard of living of the average household. Ideally, environmental and climate policies will be designed so that the benefits of addressing various forms of pollution and global climate change will exceed their costs.

Energy R&D has the potential of leading to future technologies that can lower the cost of energy, but R&D has a cost as well. R&D requires both money and, more importantly, an adequate supply of qualified scientific researchers. Shifting the direction of research toward energy diverts dollars and researchers away from other fields, unless there is both a net increase in total R&D funding and additional investment in education and training.

What, then, is the purpose of programs to promote a “Green Economy?” The vast majority of “Green Economy” funding is not going to basic and applied research, it is going to loan guarantees, standards, subsidies, regulations, and tax incentives for demonstration and, mostly, deployment of current technology. Environmental regulations and climate policy already address the externalities that provide a reason for government intervention. They provide incentives for private businesses to adopt clean energy or “green” technologies and practices **when they are cost-effective** ways of complying with environmental regulations and policies, and leave them free to do otherwise when green is not cost-effective. Therefore, federal funding and standards to promote adoption of green technology are unnecessary to achieve the environmental goals that have been accepted in public policy. For the economy as a whole, these large expenditures and requirements only serve to increase the cost of achieving the goals of environmental policy by predetermining which technologies will be favored. They do, of course, increase investment in favored technologies, but they do so at the expense of investment in more cost-effective alternatives and the consumer who always pays the bill.

Chairman BROUN. Thank you, Dr. Montgomery.

Just for the information of members of the committee, we have a vote on, and for the witnesses, we have a vote on now. We will be able to hear Mr. Kovacs’ testimony. After Mr. Kovacs’ testimony we will recess and reconvene 10 minutes after the last of four votes begins.

So, if you would, please, come right back after you vote, and we will get back as quickly as we can. We apologize for the interruption, but, unfortunately, we have got the votes.

So, now I want to recognize our final witness, Mr. William Kovacs, U.S. Chamber. Mr. Kovacs, you have got five minutes.

STATEMENT OF MR. WILLIAM KOVACS, SENIOR VICE PRESIDENT, ENVIRONMENT, TECHNOLOGY, & REGULATORY AFFAIRS, U.S. CHAMBER OF COMMERCE

Mr. KOVACS. Thank you, Chairman Broun, Ranking Member Edwards, and the members of the committee. You have asked me to address two issues; one, the impediments to the development of private sector energy projects, including the creation of green energy jobs and to identify under-utilized federal programs that could spur job growth without new statutory authority.

There are actions Congress could take, and they could take them now with any—without any appropriated funds that would create tens of thousands of clean energy and energy-efficiency jobs, generate billions of dollars in additional GDP, expand the development of clean energy technology, and substantially reduce the energy use of the world's largest energy user, the Federal Government.

You can do this by doing two simple things without any federal funding. One is you need to streamline the permitting process for private sector energy projects, and two, we need to maximize the implementation of the Energy Savings Performance Contracts that Congress passed in 2007.

Let me expand on both of these. If you look at page four on—in my testimony, it is a map of what we call our Project No Project, and that is an identification of projects in March of 2010, that were stopped by permitting challenges across the United States, and what is so fascinating about this is that the only common thread is that they were stopped by sequential challenges. They would start with one law, move to another law, move to another law, and because the statute of limitations is generally six years, you can be the last person in your law school class and hold it up for ten years. It doesn't—it is not a trick.

But what is so important is that in this process, when we did the economic study, if these projects had all moved forward during the seven-year period of time which would have been the construction period, they would have generated about $1.1 trillion in new GDP, and it would have created about 1.9 million jobs a year. And then for the 20 or 30 years that they were in existence they would have produced more jobs.

We recognize within the study that you couldn't build them all at once. There wasn't the people, there weren't the materials. So we did a sensitivity analysis, and even if you took whatever was happening and let's say we did the largest project in any state, you still had a $.5 trillion in GDP and hundreds of thousands of jobs, and we did that for nuclear or all renewables, pick your choice. But some of the projects, if a large group would have gone forward, you still would have created the jobs.

The solution there is permanent streamlining. Congress has handled this issue many times. You handled it in the Highway Bill in 2005. You literally created the time to get through the process for NEPA in half from about 72 months to 38 months. You did it in the Stimulus Project with requiring the use of NEPA in as expeditiously a manner as possible. That allowed 180,000 out of 250,000 projects to get into the marketplace quickly.

The second point that I want to talk about is energy-savings performance contracts. In a climate of fiscal restraint you literally have an $80 billion pool of contracts that you can move immediately. An Energy Savings Performance Contract is a statutorily-established, private sector partnership in which the private sector energy service company installs in federal buildings all the energy efficient equipment at its own expense and is paid from the energy savings over a 20 to 25-year period of time.

You are probably all familiar with it. This building is subject to one of the Energy Savings Performance Contracts as well as the other House buildings. The energy service company guarantees the proposed energy savings and takes full responsibility for any of the shortfalls. So there is absolutely no risk to the Federal Government. It is an $80 billion authorization that can be triggered literally by the Federal Government wanting to do this.

One of the things that we have—that has been very clear is that there have been two problems with this issue. One is because it is outside of what we would call just using appropriations, the federal contractors in the Department of Energy that manage these programs really are not familiar with it, and they could use more training, and that is based on basically GAO reports.

And the second is I think the Stimulus from what we can tell from both the GAO reports and the obligated funds under the Stimulus, because appropriated funds were available, it was easier for the Department of Energy to move and use the appropriated funds first rather than the Energy Savings Performance Contract. So what happens is you ended up in the last year with only six projects totally $104 million when you have an $80 billion authorization.

Oak Ridge National Labs indicated that this would create 40 billion jobs, $21 billion in saved energy, and take ten million cars off the road.

In my last 10 seconds I recommend that solutions and executive order get the President behind us. This is an excellent law, and if he makes it—if he requires this to be used first before appropriated funds, that would move it along. We need training and then finally Congressional oversight.

Thank you very much.

[The prepared statement of Mr. Kovacs follows:]

PREPARED STATEMENT OF MR. WILLIAM KOVACS, SENIOR VICE PRESIDENT, ENVIRONMENT, TECHNOLOGY, & REGULATORY AFFAIRS, U.S. CHAMBER OF COMMERCE

Statement
# of the
U.S. Chamber of Commerce

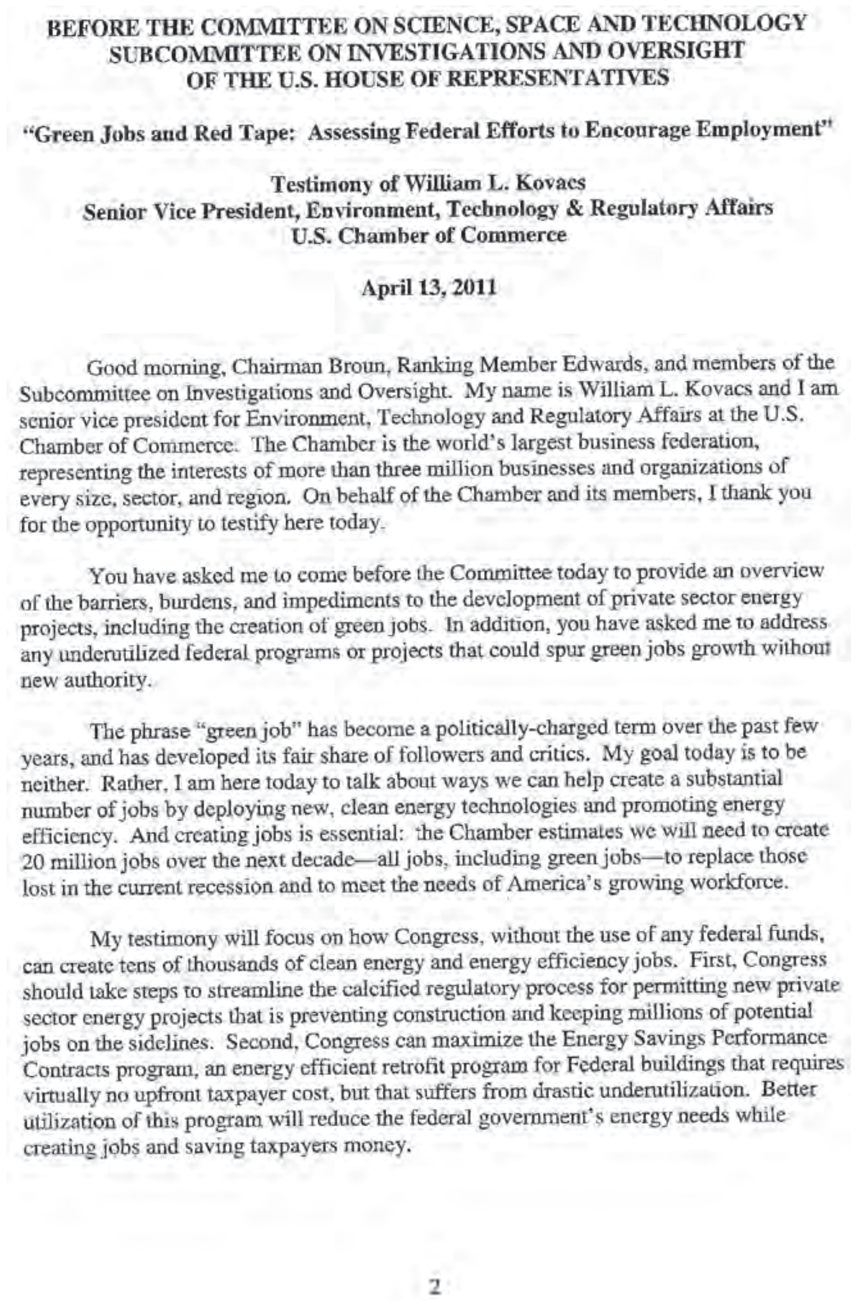
ON: GREEN JOBS AND RED TAPE: ASSESSING FEDERAL EFFORTS TO ENCOURAGE EMPLOYMENT

TO: HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY, SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

BY: WILLIAM L. KOVACS
SENIOR VICE PRESIDENT, ENVIRONMENT, TECHNOLOGY AND REGULATORY AFFAIRS

DATE: APRIL 13, 2011

The Chamber's mission is to advance human progress through an economic,
political and social system based on individual freedom,
incentive, initiative, opportunity and responsibility.



BEFORE THE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
OF THE U.S. HOUSE OF REPRESENTATIVES

"Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment"

Testimony of William L. Kovacs
Senior Vice President, Environment, Technology & Regulatory Affairs
U.S. Chamber of Commerce

April 13, 2011

Good morning, Chairman Broun, Ranking Member Edwards, and members of the Subcommittee on Investigations and Oversight. My name is William L. Kovacs and I am senior vice president for Environment, Technology and Regulatory Affairs at the U.S. Chamber of Commerce. The Chamber is the world's largest business federation, representing the interests of more than three million businesses and organizations of every size, sector, and region. On behalf of the Chamber and its members, I thank you for the opportunity to testify here today.

You have asked me to come before the Committee today to provide an overview of the barriers, burdens, and impediments to the development of private sector energy projects, including the creation of green jobs. In addition, you have asked me to address any underutilized federal programs or projects that could spur green jobs growth without new authority.

The phrase "green job" has become a politically-charged term over the past few years, and has developed its fair share of followers and critics. My goal today is to be neither. Rather, I am here today to talk about ways we can help create a substantial number of jobs by deploying new, clean energy technologies and promoting energy efficiency. And creating jobs is essential: the Chamber estimates we will need to create 20 million jobs over the next decade—all jobs, including green jobs—to replace those lost in the current recession and to meet the needs of America's growing workforce.

My testimony will focus on how Congress, without the use of any federal funds, can create tens of thousands of clean energy and energy efficiency jobs. First, Congress should take steps to streamline the calcified regulatory process for permitting new private sector energy projects that is preventing construction and keeping millions of potential jobs on the sidelines. Second, Congress can maximize the Energy Savings Performance Contracts program, an energy efficient retrofit program for Federal buildings that requires virtually no upfront taxpayer cost, but that suffers from drastic underutilization. Better utilization of this program will reduce the federal government's energy needs while creating jobs and saving taxpayers money.

I. CHANGES TO THE SITING AND PERMITTING PROCESS FOR NEW ENERGY PROJECTS COULD YIELD TRILLIONS OF DOLLARS IN GDP AND MILLIONS OF JOBS ANNUALLY

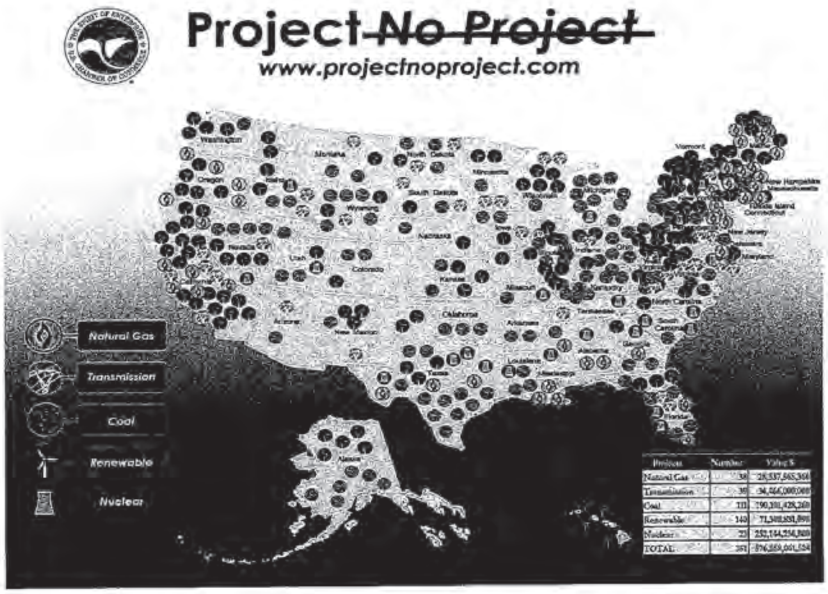
If our great nation is going to begin creating jobs at a faster rate, we must get back in the business of building things. We also need to figure out how to do it without years and years of permit delays related to our complex regulatory process that allows almost anyone to impede or stop any energy project.

A. The *Project No Project* Inventory and its Significance

For years, the Chamber knew of anecdotal evidence that projects were being delayed or stopped throughout the nation, but there was no study that systematically examined the circumstances of such challenged projects. This lack of information allowed groups that typically oppose new energy projects to tell their elected officials that clean energy was wonderful but that the local project was just not the right project for the neighborhood. Unfortunately, without a national study, our own elected leaders had no appreciation for the number of projects being stopped or substantially delayed. To address this information shortfall, Chamber staff implemented *Project No Project*, an initiative that assesses the broad range of energy projects that are being stalled, stopped, or outright killed nationwide due to "Not In My Back Yard" (NIMBY) activism, a broken permitting process and a system that allows limitless challenges by opponents of development. Results of the assessment are compiled onto the *Project No Project* Website (http://www.projectnoproject.com), which serves as a web-based project inventory. The purpose of the *Project No Project* initiative is to enable the Chamber to understand potential impacts of serious project impediments on our nation's economic development prospects, and it is the first-ever attempt to catalogue the wide array of the energy projects being challenged nationwide.

The information collection process for *Project No Project* has been a multi-year effort. All data was obtained by Chamber staff via publicly available sources, and each project contains a profile on the Website that has been written by one of the Chamber's lawyers. The profiles generally give a concise history of the project and assess its prospects going forward. Each project profile contains a series of hyperlinks to original information sources, as well as a "last updated" date stamp. All projects have been audited internally via a multi-step process. The site is truly the first of its kind; while industry-specific catalogs exist (e.g., the Sierra Club's "Beyond Coal" inventory of coal-fired power plants it seeks to close), to the Chamber's knowledge nobody has ever tried to compile a technology-neutral inventory of challenged power generation projects along the lines of *Project No Project*. The entire site received a comprehensive update in early 2011.

The Chamber found consistent and usable information for 333 distinct projects. These included 22 nuclear projects, 1 nuclear disposal site, 21 transmission projects, 38 gas and platform projects, 111 coal projects and 140 renewable energy projects—notably 89 wind, 4 wave, 10 solar, 7 hydropower, 29 ethanol/biomass and 1 geothermal project. Since some of the electric transmission projects were multi-state investments and, as such, necessitate approval from more than one state, these investments were apportioned among the states, resulting in 351 state-level projects attributed to forty-nine states:



Full descriptions for each project are available on the *Project No Project* Web site.

The results of the inventory are startling! One of the most surprising findings is that it is just as difficult to build a wind farm in the U.S. as it is to build a coal-fired power plant. In fact, over 40 percent of the challenged projects identified are renewable energy projects. Often, many of the same groups urging us to think globally about renewable energy are acting locally to stop the very same renewable energy projects that could create jobs and reduce greenhouse gas emissions. NIMBY activism has blocked more renewable projects than coal-fired power plants by organizing local opposition, changing zoning laws, opposing permits, filing lawsuits, and using other long delay mechanisms, effectively bleeding projects dry of their financing.

A few examples will help illustrate the problem. In California, the Green Path North was a proposed $500 million, 85-mile-long "green" power transmission line that would have brought renewable electricity from inland California to Los Angeles. The Los Angeles Department of Water and Power (LADWP) proposed the project to help meet its renewable electricity mandate, which must be 35 percent by 2020. In 2009, LADWP projected that 14 percent of its electricity came from renewable sources. A wide range of national and local environmental activist groups, including the Sierra Club, Center for Biological Diversity, and the Redlands Conservancy fiercely opposed the project, because it would have crossed wilderness preserves and scenic ridgelines. The opposition groups forced seven route and capacity revisions for the proposed transmission line. In addition, Senator Dianne Feinstein introduced legislation to protect California desert lands from renewable projects, which would have made it very difficult, if not impossible, to construct the Green Path North transmission line. On March 10, 2010, LADWP officially abandoned the Green Path North project, citing enormous costs and fierce opposition from environmental groups.

In Pennsylvania, Penn-Mar Ethanol attempted to construct an ethanol producing plant in Conoy Township in 2004. Neighboring Hellam Township sent a letter to the Conoy Township Board of Supervisors objecting to the ethanol plant. Hellam Township's objections included environmental risks to the surrounding area and the "risk of causing the beautiful area surrounding the Susquehanna River to become an undesirable site." In February 2005, Penn-Mar announced plans to cancel the project at the planned location and relocate the project to Franklin County, Pennsylvania, where Penn-Mar signed a $2.24 million sales agreement to buy a 55-acre tract. Almost immediately, a group calling itself "Citizens for a Quality Environment" sought to block the project *at the new location*. The group mounted local opposition and filed a lawsuit grounded in local zoning laws. An injunction was granted against the proposed plant, and in November 2005, Judge Richard J. Walsh issued an order stating that Penn-Mar Ethanol's plant was not a permitted use. The proposed plant's investors could not work out the details by the sales agreement's expiration date, and ultimately the deal fell through. Investors publicly blamed Citizens for a Quality Environment for the death of this project.

A third example comes from a challenge to biomass power generation in Wisconsin—one that occurred after the *Project No Project* inventory was completed, but one that clearly illustrates the difficulty of building any type of energy facility, even a technology that environmental groups claim to support. In 2008, We Energies settled a Clean Water Act lawsuit with Sierra Club and Clean Wisconsin over plans to build the Elm Road Generating Station, a coal-fired power plant. The settlement required, among other things, that We Energies build a 50-megawatt biomass power plant to help satisfy the state's renewable energy mandate. However, little more than two years later, the environmental groups have changed position and are now challenging the biomass plant's permit, alleging that it does not adequately account for the biomass facility's greenhouse gas emissions. Just a few days ago, the Wisconsin Department of Natural Resources issued a final permit for the facility, but one more state approval remains. Regardless of the outcome, lawsuits will almost surely follow. We Energies is working to construct the plant by 2013 to qualify for tax credits, and any further delay could severely hinder that goal.

As these examples demonstrate, NIMBYism is a complex, technology-neutral problem. No single "checklist" exists for the NIMBY plaintiff, although in every case the opponent uses the same general strategy: if at first you don't succeed, try again. And again. And keep trying as long as the law will allow in the hopes that eventually the developer will walk away. Even the environmentally-conscious Vermont Journal of Environmental Law argued in 2003 that that most environmental NIMBY plaintiffs are usually less concerned with environmental protection than they are with maintaining a standard of living.[1] The article encourages attorneys to counsel their clients away from the protracted environmental NIMBY litigation strategy—which generally benefits nobody—and toward alternative approaches, such as environmental mediation or a multi-party structured negotiation process.[2]

B. The Economic Study

When we set out to compile the *Project No Project* inventory, we expected to find 50, or even 100 projects. The fact that we (quite easily) topped 350 is absolutely shocking. More amazing is that we did not include oil and gas exploration projects or pipeline projects, which undoubtedly would have increased our totals. It became clear from our research that the nation's complex, disorganized regulatory process for siting and permitting new facilities and its frequent manipulation by NIMBY activists constitute a major impediment to economic development and job creation. Which gave rise to the next question: how much money exactly is sitting on the sidelines due to this problem?

To answer this question, we commissioned an economic study, *Progress Denied: The Potential Economic Impact of Permitting Challenges Facing Proposed Energy Projects*, which was produced by Steve Pociask of TeleNomic Research, LLC and Joseph P. Fuhr, Jr. of Widener University. An electronic copy of the study can be accessed at http://www.projectnoproject.com/progress-denied-a-study-on-the-potential-economic-impact-of-permitting-challenges-facing-proposed-energy-projects/. The Chamber asked Pociask and Fuhr to examine the potential short- and long-term economic and jobs benefits if the energy projects found on the *Project No Project* web site were successfully implemented. Like the *Project No Project* inventory itself, this study appears to be the first of its kind.

Pociask and Fuhr performed an input-output analysis, consistent with methodology used by the U.S. Department of Commerce.[3] The values they arrive at include not only of the direct investment for each project, but also indirect and induced effects. As investment is deployed and energy projects are built over a series of months and years, the economy benefits by the direct purchasing of equipment and services, as well as the hiring of workers and contractors. These activities spur suppliers and contractors to hire additional employees and to buy more equipment, in order to keep up with demand. In effect, the direct benefit of investment spawns indirect benefits in the economy. In addition to the direct and indirect benefits from investment, the income paid to workers will be used to make various household purchases, which creates additional economic benefits known as induced effects.

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[1] Colin Carrol, "NIMBY Suits: The Crutch of the Unskilled Environmental Advocate," *Vermont Journal of Environmental Law*, Oct. 10, 2003, available at http://www.vjel.org/editorials/ED10038.html.
[2] *Id.*
[3] "Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMSII)," Economic and Statistics Administration and Bureau of Economic Analysis, U.S. Department of Commerce, Third Edition, March 1997, in particular the case study described on page 11.

As Pociask and Fuhr explain in their study, the combination of direct, indirect and induced effects represents the total economic benefit from the initial investments. Essentially, as a dollar of investment (or spending) is made, increased economic output cascades along various stages of production, employees spend their additional earnings, and the economy ends up with more than one dollar of final product. This phenomenon is referred to as the *multiplier effect*. These direct, indirect and induced benefits can be measured in terms of their effect on U.S. Gross Domestic Product (GDP) – the most comprehensive measure of final demand – and they can be reflected in terms of their effects on jobs and employment earnings.

Their study has produced several significant and insightful findings. For example, Pociask and Fuhr find that successful construction of the 351 projects identified in the *Project No Project* inventory could produce a $1.1 trillion short-term boost to the economy and create 1.9 million jobs annually. Moreover, these facilities, once constructed, continue to generate jobs once built, because they operate for years or even decades. Based on their analysis, Pociask and Fuhr estimate that, in aggregate, each year of operation of these projects could generate $145 billion in economic benefits and involve 791,000 jobs.

The Chamber recognizes that moving forward on all the projects is highly unlikely. There simply would not be enough materials or skilled labor to construct all 351 projects at the same time, and to do so in a cost-effective manner. To address this problem, the study includes a sensitivity analysis, which examines the jobs and economic data if only some projects were approved. Table 1 below shows the results of this sensitivity analysis.

Table 1. What If Some Of These Projects Were Approved?

Projects Approved	Total GDP ($B in PDV)	Employment Earnings ($B in PDV)	Annual Jobs (in Thousands)
Only Largest Project in Each State			
Investment Effect	$449	$144	572
1-year Operations	$50	$12	272
Only Nuclear Projects			
Investment Effect	$411	$132	468
1-year Operations	$44	$11	267
Only Renewable Projects			
Investment Effect	$151	$49	447
1-year Operations	$17	$4	78
Only Transmission Projects			
Investment Effect	$64	$213	106
1-year Operations	$1.4	$0.3	7
All 351 Projects			
Investment Effect	$1,093	$352	1,880
1-year Operations	$145	$35	791

While it is unreasonable to think that all 351 projects would be constructed, even a subset of the projects would yield major value. As Table 1 shows, the construction of only the largest project in each state would generate $449 billion in economic value and 572,000 annual jobs. The key is that we must build something; right now we are building very little.

C. What Is Needed: Permit Streamlining

Unfortunately, despite the potentially significant economic and employment stimulus that could result from building these new energy facilities, the outlook for many of these projects is murky. Serious regulatory inefficiencies and permitting delays persist and NIMBY activists are winning more often than they are losing. All of this is leading to serious marketplace uncertainties, which can drive investors to opt not to finance new major construction projects or pull out of previous financial commitments.

The Chamber therefore recommends that Congress enact legislation to streamline the siting and permitting process for new energy projects. While considering options, lawmakers may want to model legislation off one or more effective and workable streamlining provisions already in place: SAFETEA-LU Section 6002, National Environmental Policy Act (NEPA) streamlining language in the American Recovery and Reinvestment Act, or the Federal Communications Commission's "shot-clock."

i. SAFETEA-LU Section 6002

Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Act: A Legacy for Users (SAFETEA-LU) accelerates the environmental review process for federal highway projects. Section 6002 contains two key components: (1) process streamlining and (2) a statute of limitations. The process streamlining component does not in any way circumvent any NEPA requirement; rather, it designates a lead agency (in SAFETEA-LU's case, DOT) and requires early participation among the lead agency and other participating agencies. The goal of the process streamlining provision was not to escape NEPA, but merely to facilitate interagency and public coordination so that the process could be sped up. The second key element in Section 6002 is a 180-day statute of limitations to "use it or lose it" on judicial review. Without such a provision, the prevailing statute of limitations is the default six-year federal statute of limitations for civil suits.

Section 6002 is working, and working well. A September 2010 report by the Federal Highway Administration found that just the process streamlining component of Section 6002 has cut the time to complete a NEPA review in half, from 73 months down to 36.85 months. The 180-day statute of limitations is cutting back on a typical NIMBY practice of waiting until the very last day to file a lawsuit against a project. Because the only real motive is to exploit the law to delay projects, this tactic is particularly effective with a six-year statute of limitations. Even with the 180-day statute of limitations, groups still wait until the last week or last day to file, so that the project is delayed as long as possible. A good example of this happening is the Maryland InterCounty Connector[4] highway project.

ii. NEPA Streamlining in the Stimulus

During debate on the 2009 economic stimulus bill, the American Recovery and Reinvestment Act ("Recovery Act"), the Chamber called attention to the fact that the flawed permitting process in effect ensures that no project will ever truly be "shovel-ready." Senators Barrasso and Boxer worked together to secure an amendment to the bill requiring that the NEPA process be implemented "on an expeditious basis," and that "the shortest existing applicable process" under NEPA must be used.

This amendment has made all the difference in getting Recovery Act projects underway. According to a February 2011 report to Congress by the White House Council on Environmental Quality, over 180,000 of the 272,000 Recovery Act projects covered by NEPA received the most expeditious form of compliance treatment possible—a categorical exemption—and work was able to begin and jobs were created.[5]

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[4] http://www.washingtonpost.com/wp-dyn/content/article/2006/11/01/AR2006110103155.html. The final Record of Decision was issued on May 29, 2006. Sierra Club and Environmental Defense gave notice of intent to sue on November 2, 2006, and filed the lawsuit on December 20, 2006.

[5] The Eighth Report on the National Environmental Policy Act Status and Progress for American Recovery and Reinvestment Act of 2009 Activities and Projects, *available at* http://ceq.hss.doe.gov/ceq_reports/reports_congress_feb2011.html.

Moreover, only 830 projects received an environmental impact statement, the longest available process under NEPA.[6] These circumstances confirm a recognition among some policymakers that the permitting process is harming our ability to grow our economy so we can compete with the world.

The Chamber is not asking that anyone's rights be denied; rather we are suggesting that those opposing a project must exercise their rights in a defined period of time after a decision is made, and that all claims be immediately addressed. The developer of a project should at least be afforded a decision to begin construction in one or two or even three years, not ten or fifteen.

iii. FCC Shot-Clock

Even cellular telephone towers are challenged by NIMBYs. At one point it was estimated that the construction of approximately 700 cell towers were being challenged. Without the new cell towers, the expansion of broadband was limited. To address this issue, the Federal Communications Commission (FCC) issued new regulations in November 2009 to speed up the siting and permitting of cellular telephone towers and antennas. Under the new rules, state and local governments have a 90-day deadline to process applications for co-located facilities where two or more providers share a tower, and 150 days to process applications for new towers. However, if the government authority has not acted on the application within the requisite time period, the applicant may file a claim in court. There is not enough data yet to judge the effectiveness of the rule, which is currently being challenged by several municipalities.

* * *

The economic and job impact projections of the *Project No Project* study show that millions of jobs, and hundreds of billions of dollars in potential economic value, continue to sit on the shelf. This is not good for the nation's well-being. Widespread failure to move energy projects forward in a timely manner works against our ability to address two of our nation's most significant concerns: promoting substantial job creation and stimulating economic growth. The longer it takes to get the shovels into the ground and projects underway, the more expensive these projects become (owing to rising labor and materials costs as well as other factors) and correspondingly, the less confidence investors will have for successful project outcomes; a condition that will only limit the future competitiveness of the country.

Slowly but surely, the issue of permit streamlining is gaining acceptance across party lines. On March 3, 2011, Minnesota Governor Mark Dayton, a Democrat, signed a Republican-backed bill that streamlines the environmental permitting process. The new law sets goals that state agencies should issue or deny all environmental permits within 150 days of submission. In signing the bill into law, Gov. Dayton cited a shared desire to streamline and improve the permitting process to help responsible businesses locate or expand in Minnesota and create new jobs for our citizens."[7]

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[6] *Id.*

The consensus that was reached in Minnesota can and should be brought to the national stage. Congress should carefully consider how all of these federal permitting obstacles and uncertainties and time delays can be addressed so as to speed up the processing, consideration, approval decisions, and development of many of the job-creating projects whose progress has so far been denied. Failure to find a path forward that will allow projects to be built in a reasonable timeframe should not be acceptable. If we fail to take on this challenge, we could find ourselves faced with: an endless litany of project failures; loss of investor confidence; fewer jobs created than we have the potential to create; and an inability to provide this nation with the energy it needs.

II. THE FEDERAL GOVERNMENT CAN CREATE JOBS, SAVE TAXPAYER DOLLARS, AND CONSERVE ENERGY BY MAXIMIZING THE ENERGY SAVINGS PERFORMANCE CONTRACTS PROGRAM

The 112th Congress has brought with it a changed political climate. Fiscal restraint is paramount, and this concern has proponents of energy efficiency measures—the Chamber included—scrambling to develop policy options that strike the proper balance between spending and results. President Obama announced a "Better Buildings Initiative" earlier this year, a set of incentives and other programs designed to spur the private sector to invest in energy efficiency in commercial buildings. These are admirable goals. However, the Chamber is disappointed that the President's plan lacks any discussion of Energy Savings Performance Contracts (ESPCs), a severely underutilized $80 billion program that uses private sector money to achieve energy savings in Federal buildings while creating jobs. It is puzzling that the nation's largest energy user—the Federal government—cannot find ways to use this program more effectively. At a time when there is a critical need for reduced government spending, ensuring the availability of mechanisms to save energy in Federal buildings at no upfront cost to the government is good policy.

A. The ESPC partnership and its evolution

According to the U.S. Department of Energy (DOE), an ESPC is "[a] contract for a term of up to 25 years under which an Energy Services Company (ESCO) designs, acquires, installs, and finances energy and/or water conservation measures for an existing Federally-owned building and is repaid by the agency from the resulting energy, water, and related cost savings."[8] ESPCs are a statutorily-established program of public-private partnerships between federal agencies and ESCOs that put the best that the private sector has to offer to work in improving Federal energy performance.[9]

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[7] http://www.scribd.com/doc/49974415/20110303161040406.

[8] "Energy Savings Performance Contracts (ESPCs): A Different Kind of Animal," Kimberly J. Graber, Office of Chief Counsel, U.S. Department of Energy, Feb. 19, 2010; *available at* http://www.eli.org/pdf/events/02.18.10dc/Graber.pdf.

Under the ESPC program, ESCOs install new energy efficient equipment at Federal facilities at no upfront cost to the government; Federal agencies pay off this investment over time with the funds saved on utility costs, and the private sector contractors guarantee the savings.[10] Energy savings can be realized through improvements in building components such as energy efficient lighting, building management control systems, and, heating, ventilating, and air-conditioning systems.[11]

By law, the government never pays more than it would have paid for utilities if it had not entered into the ESPC.[12] In addition to improving efficiency and saving taxpayer dollars, ESPC retrofits can stave-off years of deferred maintenance at federal facilities, while upgrading mission-related infrastructure.[13] This is a much better alternative to business as usual—the continued use of inefficient older equipment that wastes energy and requires higher maintenance and repair expenditures, forfeiting potential energy and cost savings. You may have even seen ESPCs at work while roaming the halls of the House office buildings; in 2010, the Architect of the Capitol awarded an ESPC for facility infrastructure upgrades in the Rayburn, Longworth, Cannon, and Ford House Office Buildings, and the House Page Dormitory.

Originally, Federal agencies could enter into an ESPC directly with an ESCO via a stand-alone contract. However, that wasn't happening.[14] To remedy this problem, DOE competed and awarded "Super" ESPC contracts in the late 1990s. Super ESPCs are competitively awarded contracts to qualified contractors that provide for an indefinite quantity of supplies or services during a fixed period of time. By changing the program in this manner, agencies can implement Super ESPC projects in far less time than it takes to develop stand-alone ESPC projects. General terms and conditions are established in the overarching contracts, and agencies implement projects by awarding delivery orders to the Super ESPC ESCOs.

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[9] Statutory authority for the ESPC program can be found at 42 U.S.C. §§ 8287-8287d; implementing regulations are codified at 10 C.F.R. Part 436, Subpart B.

[10] An ESCO conducts a comprehensive energy audit for the Federal facility and identifies improvements to save energy. In consultation with a Federal agency, the ESCO designs and constructs a project that meets the agency's needs and arranges the necessary financing. The ESCO guarantees that the improvements will generate energy cost savings sufficient to pay for the project over the term of the contract. ESCOs are paid over time through savings realized, with federal agencies paying off equipment investments through savings realized on utility costs from the efficiency improvements that are made—the Federal agency repays the ESCO for its capital investment over a period of years from the savings generated. Payments over the life of an ESPC, some extending for as long as 25 years, are based on projected energy use and estimated energy savings agreed to by the Government. After the contract ends, all additional cost savings accrue to the agency. *See* Graber, note 7 *supra*.

[11] *See* http://www1.eere.energy.gov/femp/pdfs/espc_intro.pdf.

[12] *See* Graber, note 8 *supra*.

[13] *Id.*

[14] *Id.*

In December 2008, DOE recompeted the Super ESPCs in a full and open competition, resulting in the selection of sixteen new ESCOs that were determined to be qualified to perform energy savings and renewable energy services on a world-wide basis for ten years.[15] A combined ceiling of $80 billion was set for the contracts for use toward energy efficiency, renewable energy and water conservation projects at federally-owned buildings and facilities.[16] These changes refined the program and made it better. The designation of Super ESPCs, which are administered by the U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP), streamlined the ESPC award process considerably.[17]

The ESPC program is a "win-win" for the private sector and the Federal government, and should be a key component in helping the Federal government meet its energy efficiency and renewable energy goals. Yet despite the readiness of the ESCOs to enter into ESPCs, Federal agencies seem inherently unable to do so on a broad basis. As a result, only a small percentage of the $80 billion ceiling has even been met. Failure to grasp the full potential of ESPCs is costing jobs, money and energy.

B. Underutilization of the ESPC Program

As of March 2010, DOE records showed that more than 550 ESPC projects worth $3.6 billion were awarded to 25 Federal agencies and organizations in 49 states and the District of Columbia.[18] However, these numbers could and should be much higher. Between FY2003 and FY2008, the Federal government invested about $622 million annually in energy efficiency, but of this amount, only 38% was through ESPCs.[19] In FY2009, total investment in ESPCs was roughly $386 million, with additional awards accounting for about another $354 million to the end of the calendar year.[20] Most recently, under the recompeted Super ESPC program, which has been in place for over two years and for which the contract ceiling is $80 billion, there have only been about $104 million in new contracts for six projects.[21]

The underutilization of ESPCs is problematic because the Federal government has committed itself to reducing energy intensity by 30% by 2015 and increasing on-site renewable energy generation by 20% by 2020.[22] DOE's 2008 *Federal Energy Management Report*[23] estimates that between 2009 and 2015 the Federal government will have to invest upward of $9 billion (approximately $1.4 billion annually) to meet the energy intensity reduction goals set by Executive Order 13423 and the Energy Independence and Security Act of 2007 (EISA). E.O. 13423 requires Federal agencies to reduce energy intensity by 3% each year, leading to 30% by the end of fiscal year (FY) 2015 compared to an FY 2003 baseline; this goal was given the weight of law when ratified by EISA.[24]

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[15] "US $80 Billion in Contracts Awarded by DOE" RenewableEnergyWorld.com, December 23, 2008 at: http://www.renewableenergyworld.com/rea/news/article/2008/12/us-80b-in-contracts-awarded-by-doe-54378.

[16] *Id.*

[17] (a) See: John A. Shonder and Patrick J. Hughes, Evaluation of the Super ESPC Program—Reported Energy and Cost Savings (Interim Report, May 2007, ORNL/TM-2007/065), Oak Ridge National Laboratory, May 2007; (b) The Department of Energy's Golden Field Office is responsible for awarding and administering the Super ESPC umbrella contracts that can be used by all Federal agencies for facilities worldwide (http://www.ig.energy.gov/documents/IG-0822.pdf).

[18] http://www1.eere.energy.gov/femp/financing/espcs.html.

[19] Notes from: "Federal Retrofits and Greening of the Government." Federal Performance Contracting Coalition (FPCC), http://federalperformancecontracting.com/.

[20] *Id.*

[21] http://www1.eere.energy.gov/femp/pdfs/do_awardedcontracts.pdf.

One reason why the ESPC program has been underutilized of late is that it is believed that the Recovery Act,[25] which uses large amounts of taxpayer-footed funding, has served as a major source of available, appropriated funds for projects that improve energy efficiency. The use of Recovery Act funds results in a significant cost to the taxpayer, but nonetheless this influx of readily available appropriated dollars has been a disincentive to use of the ESPC program. The reasoning is understandable: why use the ESPC process when there is plenty of stimulus money already available. GAO reports that as of March 10, 2011, DOE has obligated the full $3.2 billion of Recovery Act funding provided for the Energy Efficiency and Conservation Block Grant Program,[26] which according to DOE "can be used for energy efficiency and conservation programs and projects communitywide, as well as renewable energy installations on government buildings."[27]

The Recovery Act lacks staying power; because most of its funds have been accounted for, it is winding down, leaving out this source of funds in the future for support of energy savings initiatives. Moreover, it has been found in one large study that appropriations-funded projects took almost four years longer to implement than ESPCs.[28] Nonetheless, competition with readily-available, taxpayer-funded grants has been a continual problem for ESPCs. For instance, in 2003, an Oak Ridge National Laboratory (ORNL) study reported: "Despite the Congressional and Presidential directives to use ESPCs, some agencies have been reluctant to do so. Decision makers in these agencies see no reason to enter into long-term obligation to pay interest on borrowed money out of their own operating budgets if instead Congress will grant them appropriations to pay for the improvements up front."[29]

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[22] *See, e.g.*, Executive Order 13423 - Strengthening Federal Environmental, Energy, and Transportation Management—see http://www1.eere.energy.gov/femp/regulations/eo13423.html, which set more challenging goals than the Energy Policy Act of 2005 (EPAct 2005) and superseded E.O. 13123 and E.O. 13149. E.O. 13423 requires Federal agencies to reduce energy intensity by 3% each year, leading to 30% by the end of fiscal year (FY) 2015 compared to an FY 2003 baseline. This goal was given the weight of law when ratified by EISA 2007 (http://energy.senate.gov/public/_files/RL342941.pdf).

[23] http://www.nrel.gov/docs/fy09osti/46021.pdf.

[24] Energy Independence and Security Act of 2007 (EISA), *available at* http://www1.eere.energy.gov/femp/financing/espcs_regulations.html.

[25] http://www.recovery.gov/About/Pages/The_Act.aspx.

[26] http://www.gao.gov/newitems/d11483t.pdf.

[27] http://www1.eere.energy.gov/wip/eecbg.html.

[28] DOE Office of Inspector General, *Report on DOE's In-House Energy Management Program. DOE/IG-0317, January 1993.*

A second problem preventing widespread ESPC use is a lack of familiarity with the ESPC program among Federal government officials: Super ESPCs are an untraditional and complex contracting mechanism, and there is no strong incentive in the Federal government to do things that are innovative.[30] With regard to using ESPCs, agency officials often report that they lack technical and contracting expertise.[31] Moreover, a recent GAO report indicated that, while agency officials are participating in training and implementing initiatives for energy management personnel, Federal facilities may lack staff dedicated to energy management and may find it difficult to retain staff with sufficient energy or contracting expertise.[32]

In regard to the above observations, GAO reports:

> Lack of expertise in energy management and high staff turnover may create challenges for negotiating and overseeing alternative financing mechanisms. Energy projects funded through alternative financing often require a high level of expertise in complex areas such as procurement, energy efficiency technology, and federal contracting rules. Many agencies told us that without experienced personnel, they face challenges in undertaking contracts that are necessary to meet energy goals. Officials from multiple agencies commented that high turnover rates exacerbate the difficulties associated with alternative financing.[33]

Similarly, in a September 2009 audit report, DOE's Office of Inspector General, which also noted the need for more guidance for agency officials, observed: "Our testing revealed that the majority of those Federal and facility contractor officials charged with management of ESPC orders had either received no training or received training that was not sufficiently detailed to permit them to fully understand or perform all required duties."[34]

DOE has taken steps to address the deficiencies noted.[35] Moreover, under the Super ESPC contract vehicle, ESCOs have always been required to guarantee proposed savings, implement Measurement and Verification (M&V) procedures, and take financial responsibility for any shortfall between guaranteed and actual savings for the term of each ESPC task order. The government maintains aggressive oversight of all ESPC projects throughout their terms, which does not occur in other contract types.[36]

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[29] Hughes, et. al., *Evaluation of Federal energy Savings Performance Contracting – Methodology for Comparing Process and costs of ESPC and Appropriations-Funded energy Projects, paper prepared by Oak ridge National Laboratory (March 2003).*

[30] Notes from: "Federal Retrofits and Greening of the Government." Federal Performance Contracting Coalition (FPCC), http://federalperformancecontracting.com/.

[31] U.S. Government Accountability Office (GAO), *Energy Savings – Performance Contracts Offer Benefits, but Vigilance is Needed to Protect Government Interests* (GAO-05-340), June 2005.

[32] GAO, *Federal Energy Management* (GAO-08-977), September 2008.

[33] *Id.*

[34] Office of Inspector General, U.S. Department of Energy, Audit Report – Management of Energy Savings Performance Contract Delivery Orders at the Department of Energy (DOE/IG-0822), September 2009.

[35] *Id.*

It has also been noted that agencies have a tendency to eliminate project elements having longer payback times, such as renewable energy installations or those items that are targeted toward sustainability goals broader than energy savings.[37] For example, renewable electricity projects have a median payback period of 18.1 years, while installation of advanced metering technology has a payback period of less than a year.[38] This situation can complicate the simultaneous achievement of several energy goals, such as increased use of renewable energy, reducing energy intensity, and ensuring a lower carbon footprint. The use of an ESPC allows those longer term payback items to be bundled with shorter term measures for a comprehensive approach

C. Unlocking the Potential of ESPCs Will Lead to Jobs

How useful and important are ESPCs? In 2007, James L. Connaughton, Director of the White House Council on Environmental Quality, commented that one of our best opportunities to retrofit the energy systems needed to achieve Executive Order and legal requirements is greater use of private government-wide Energy Savings Performance Contracting.[39] He urged Federal agencies to "lead the way – and to lead the way by example in the wise use of our energy resources and elimination of inefficient energy practices." Achieving these goals, he remarked, "requires that Federal agencies look beyond appropriated funds to further accomplish their energy objectives and by using market-based solutions found through the use of innovative performance contracting programs that fund the investments upfront allowing the government to pay for improvements through the guaranteed saving obtained."

The use of ESPCs provides multiple benefits, including[40]:

- Access to private-sector energy savings expertise.
- Built-in incentives for ESCOs to provide high-quality equipment, timely services, and thorough project commissioning.
- Infrastructure improvements to enhance mission support.
- Healthier, safer working and living environments.
- Flexible, practical contract and procurement processes.

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[36] The new Super ESPC contract requires even more rigorous M&V procedures and processes to ensure guaranteed savings are achieved or exceeded than the previous program; *see* note 9, *supra*.

[37] Notes from: "Federal Retrofits and Greening of the Government," Federal Performance Contracting Coalition (FPCC), http://federalperformancecontracting.com/.

[38] Testimony of Drury Crawley before the Subcommittee on Federal Financial Management, Government Information, Federal Services, and International Security Committee on Homeland Security and Government Affairs, U.S. Senate, July 16, 2009.

[39] James L. Connaughton, Director, Council on Environmental Quality, "Memorandum to Heads of Executive Branch Departments on Substantially Increasing Federal Agency Use of Energy Savings Performance Contracting," August 3, 2007.

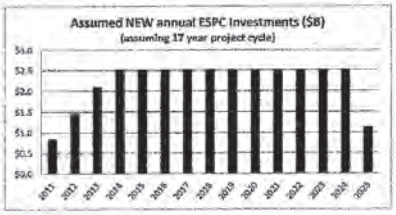
[40] *See* http://www1.eere.energy.gov/femp/pdfs/espc_intro.pdf.

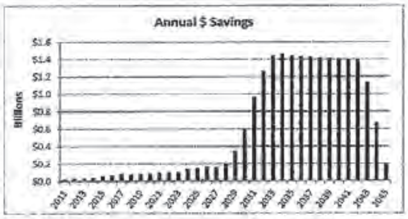
- Expert, objective technical support through FEMP assistance, including legal and financing guidance, project facilitators, advanced technology experts, and training for Federal agencies.
- Guaranteed energy and cost savings.
- Enhanced ability to plan and budget energy, operation, and maintenance accounts.
- Minimized vulnerability to budget impacts due to volatile energy prices, weather, and equipment failure.

What would be the benefits of utilizing the entire Super ESPC $80 billion contracting authority? This issue was recently evaluated by John Shonder and Robert Slattery at ORNL.[41] In performing their analysis, various assumptions were made, including spending out the $80 billion over 15 years (using $32B as the investment amount with the rest being financing and O&M); that on average there was a 17 year payback; and that savings lasted for 20 years. ORNL found that reaching the $80 billion contract authority through private investment and financing could provide:

- ❖ $21 billion in net savings to the U.S. Government;
- ❖ 32 billion of avoided federal expenditures on infrastructure and equipment;
- ❖ Energy savings of 6.8 Quads (about 1.2 billion barrels of oil on a barrel of oil equivalent basis);[42]
- ❖ Creation of 527,000 job-years; and
- ❖ The equivalent of taking approximately 10,000,000 cars permanently off the road.

The charts below, produced by ORNL, illustrate the significant savings over time that full utilization of the ESPC program would provide.





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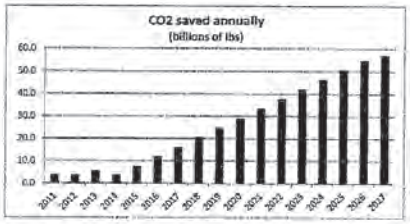
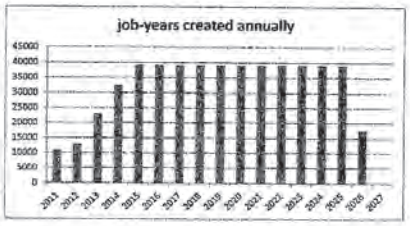
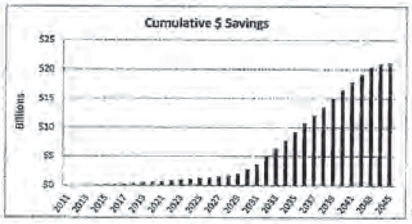
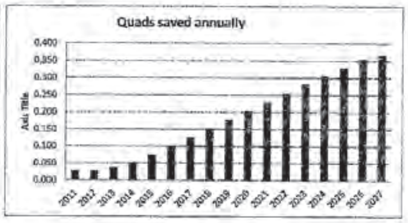
[41] John Shonder and Bob Slattery at ORNL performed the analysis at the request of Skye Schell of DOE's FEMP program.

[42] The barrels of oil estimate is based on: 6.8 Quads (6.8 x 10^{15} Btus) and the IRS definition of a "barrel of oil equivalent" as 5.8 million Btu (http://www.irs.gov/pub/irs-drop/n-99-18.pdf).









D. Recommendations for Strengthening the ESPC Program

Meeting the mandated Federal energy intensity reduction and other goals noted above will require that more private investment occur and at a higher rate than has so far been committed to. Yet while the use of ESPCs could help achieve large energy savings (and create jobs) at no up-front costs, this, as seen from the above discussion, is not happening.

The general consensus among the ESCOs is that the program as designed functions reasonably well, and that major legislation to "fix" ESPCs is not needed. More than anything, it seems, resistance to ESPCs is a function of built-in culture at various agencies, and change in culture can best be addressed from the top down.[43] The Chamber recommends the following actions, done jointly by Congress and the Executive Branch, to maximize the benefits of the ESPC program:

- *Issuance of a Presidential Executive Order directing that agencies use ESPCs for the majority of their energy projects and energy related infrastructure acquisitions*. The Executive Order should state a preference for private sector financing mechanisms such as ESPCs and Utility Energy Services Contracting[44] to upgrade Federal facilities and meet energy efficiency and sustainability-related mandates and goals. These programs should be the first energy efficiency options for agencies, not the last. In order to meet the various government energy goals (such as energy savings as well as renewable energy and emission reduction objectives) many ESPC projects should be comprehensive in nature. Agencies should be required to ensure that program managers understand the need to and how to bring about this outcome. Finally, agencies should be permitted to request appropriated dollars for energy infrastructure only after showing why an ESPC could not be used.

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[43] Obviously the fact that the Federal government resists energy efficiency measures in the face of laws requiring it to do so speaks volumes to the massive educational campaign that must be done for American citizens if a similar initiative were to be undertaken.

[44] Utility energy service contracts (UESCs) offer Federal agencies an effective means to implement energy efficiency, renewable energy, and water efficiency projects. In a UESC, a utility arranges financing to cover the capital costs of the project, which are repaid over the contract term from cost savings generated by the energy efficiency measures. With this arrangement, agencies can implement energy improvements

- *Expanded training for Federal ESPC employees and improvement of the level of contracting knowledge among agency officials responsible for management of ESPC programs*. Where deficiencies in the knowledge base among contracting officials are noted, immediate steps should be undertaken to address and correct this problem. Moreover, steps should be implemented to ensure the adequacy of staffing levels necessary to process and manage ESPCs, and steps should be taken to retain highly trained and knowledgeable staff.

- *Congressional oversight and reporting*. Agencies should be required to make periodic reports to Congress as to the progress they are making in achieving the $80 billion ESPC target. In reporting to Congress, they should report on all energy projects undertaken and why an ESPC was or was not used in each case. Such a requirement will not only keep agencies focused on the program, but will also further the transparency goals of the Administration by informing the public about progress in using these contracting mechanisms to achieve the Federal government's energy goals. Moreover, heightened transparency enables sharing of lessons learned, thereby stimulating familiarity and confidence in ESPC programs.

ESPCs are a critical tool that will enable the Federal government agencies to meet statutorily-mandated energy reduction goals at no upfront cost to taxpayers. If utilized to their full potential, ESPCs can create tens of thousands of full-time jobs. The Chamber strongly urges increased Federal use of ESPCs, and stands ready to work with Congress and the Executive Branch to maximize the ESPC program.

Thank you for the opportunity to testify today. I look forward to answering any questions you may have.

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with no initial capital investment. The net cost to the Federal agency is minimal, and the agency saves time and resources by using the one-stop shopping provided by the utility (see http://www1.eere.energy.gov/femp/financing/uescs.html).

Chairman BROUN. Thank you, Mr. Kovacs. I appreciate all the witnesses staying pretty much within your five minutes and Dr. Montgomery, for you being even under time. If I remember last time you were here, you were under time also, and I appreciate that very much.

Unfortunately, we have got about six minutes or 6–1/2 minutes on this vote. You all can stand, the witnesses can stand at ease. The committee will recess until 10 minutes after the last vote begins.

[Whereupon, at 2:42 p.m. the subcommittee recessed, to reconvene at 3:28 p.m., the same day.]

Chairman BROUN. I call to order the continuation of this hearing, and I thank our witnesses for your forbearance in our going to vote, and we tried to rush back here to minimize you all's time. So I thank you all for your testimony, and I want to remind members that the committee rules limit questions to five minutes, and the chair at this point will open the round of questions. I recognize myself for five minutes.

Federal efforts to create green jobs costs money. Our Nation is currently very heavily in debt and running a huge deficit that is unsustainable.

Where are we getting the money to fund these projects, and what impact does that have on the overall economy?

I would like anyone who—Dr. Green is nodding his head, so I will give you first go at that.

Mr. GREEN. Other than printing up money the government doesn't have any money, and therefore, when it gives money to subsidize an industry or to create jobs in a certain sector or to subsidize battery production and so forth, it takes that money from another part of the productive economy.

Unless you subscribe to the mattress theory of capital, which is that people actually stick their capital under a mattress and don't have it working somewhere in the economy, either in their bank or in their savings account or in investments, it is simply the truth that the government scoops money out of the economy here, and they hand it over here. They take their cut along the way, and the jobs they create are more expensive than would be created in the market, and you have less jobs.

Chairman BROUN. Dr. Kreutzer.

Mr. KREUTZER. I would say even if people did put their money in their mattress, you have to follow the real resources, all right, and if you are somehow going to build a new high-tech economy entirely with people from the unemployment line, you know, then that is where the cost would be low. But that isn't what happens. I mean, we use resources that have an opportunity cost.

Chairman BROUN. I think Mr. Kovacs, I saw that you were nodding. Did you want to——

Mr. KOVACS. I am happy to take a crack at it.

Chairman BROUN. Dr. Bivens.

Mr. BIVENS. I mean, the short answer is they are borrowing it, and now is a perfect time to borrow it because U.S. households and businesses are saving at historic rates because they are terrified because of the recession, they have lost a lot of wealth, and they are taking that savings that otherwise would not go to productive use, and they are making sure that there is enough demand in the economy to fill the hole caused by the bursting of the housing bubble.

Chairman BROUN. Mr. Kovacs. Or Dr. Montgomery. We will just go right down the line. Dr. Montgomery.

Mr. MONTGOMERY. Thank you. I think that the notion of real resources really is the important one, that that is what most of the green jobs studies miss, that you have to ask where the money is, where the funding is coming from, and that means what the real resources are, what is the capital and labor that is building green technology, what would it be doing otherwise.

And if the government has to provide subsidies to get that capital labor into green technologies, that means it costs more than what the alternative would have been.

So, yes, that is the sense in which there is a cost, but I think in terms of fiscal stimulus, there really is an error in thinking that we can justify spending on green jobs as a short-term stimulus, because it is probably the worst way to spend short-term money. What we need to do for—every fiscal economist agrees, I think, that in the recession what you want to do is you want to get money into people's hands as fast as possible, you want to ramp that spending up rapidly, and then you want to ramp it down just as rapidly when you are coming out of the recession.

What you want to do for R&D and technology development is provide a long-term, stable set of incentives as I was describing before. That is exactly the opposite of the program. That is the last program you would want to try to ramp up and ramp down to do something about the recession, even if you believe that fiscal policy is going to work.

Chairman BROUN. Mr. Kovacs.

Mr. KOVACS. Well, I certainly don't want to sound like a broken record, but I do want to push the Energy Savings Performance Contracts. In some way, shape, or form they have been around since 1985. They are a bipartisan effort. All the money is put forth through the private sector. You are—the government is guaranteed that they will not pay any more than their energy costs. They theoretically will save about $21 billion depending on how the contract, depending on how long the equipment lasts beyond the contract period. They take, you know, what is the equivalent of ten million cars off the road, but more than anything the government is guaranteed that it will not pay more, and it creates jobs.

Chairman BROUN. Thank you, Mr. Kovacs. I have three-quarters of a minute left, so I will ask Dr. Kreutzer, I think you brought up Evergreen Solar. They received $20 million in funds to build a plant in Devens, Massachusetts. Shortly after receiving those funds Evergreen Solar shuttered the plant, fired 800 workers, is now moving its operations to China.

What presents—wasn't it you, Dr. Kreutzer that—oh, Dr. Green. Okay. Dr. Green then, what prevents other companies from doing the same?

Mr. GREEN. Absolutely nothing, and in fact, all the incentives point in the opposite direction. China has temporarily at least cornered the market on the rare earth elements which are used to make advanced technologies, including cell phones, wind turbines, solar panels, and the like, and they are instituting cuts in exports of those materials.

And so if you want to produce and have access to these materials and lower labor rates and lower environmental standards for production, and it is—these are quite damaging technologies to produce, you want to go build them in China.

So the incentive is to actually take the Stimulus—take government money here, do your R&D here, and then take what you have learned to the low-cost production in China.

Chairman BROUN. Thank you, Dr. Green. My time is up, and I recognize Ms. Edwards for five minutes.

Ms. EDWARDS. Thank you, Mr. Chairman, and thank you to our witnesses. I just have one quick question, and you can just answer yes or no, and then we will get to the meat of it.

I am curious as to whether you or your organization, the organizations that you represent supported the American Recovery and Reinvestment Act, the Stimulus Package?

Mr. GREEN. AEI as an institution does not take official positions. Some of our scholars did, and some of the scholars didn't, I believe.

Ms. EDWARDS. Did you?

Mr. GREEN. No, I did not.

Ms. EDWARDS. Thank you.

Mr. KREUTZER. Yeah. That is not my area of energy, and I am not speaking for Heritage, but I don't believe they supported it.

Ms. EDWARDS. Thank you. Dr. Bivens.

Mr. BIVENS. Our institute did support it.

Ms. EDWARDS. Thank you. Dr. Montgomery.

Mr. MONTGOMERY. No. Consulting firms clearly don't support legislation one way or the other.

Ms. EDWARDS. Did you?

Mr. MONTGOMERY. I feel that my job is to try to explain when I am asked what the likely consequences of decisions are and——

Ms. EDWARDS. So you don't have a position on the American Recovery and Reinvestment Act?

Mr. MONTGOMERY. I would be happy to, as I am today, discussing what I think its effects were. I don't know whether you mean that is a position or not, but these are certainly my professional opinions about what the effects of the act——

Ms. EDWARDS. But you didn't have a position at the time whether you supported or opposed the Recovery Act?

Mr. MONTGOMERY. What do you mean by a position?

Ms. EDWARDS. Did you support or oppose the Recovery Act? Did you——

Mr. MONTGOMERY. In what context?

Ms. EDWARDS. —support——

Mr. MONTGOMERY. Party conversation or——

Ms. EDWARDS. Let me finish my question, please. Did you support the President's signing into law and the passage out of this Congress of the American Recovery and Reinvestment Act?

Mr. MONTGOMERY. Well, I am not a member of Congress, so I didn't get to vote on it one way or the other.

Ms. EDWARDS. Thank you. Mr. Kovacs.

Mr. KOVACS. The Chamber supported it.

Ms. EDWARDS. Thank you. I am just curious when it was passed, it was, you know, I think it was because of a collapse in consumer demand and a financial system that really was on the brink of disaster and job losses, and so I am curious as to each of you, if there is a situation that doesn't justify the government stepping in to create jobs and restore confidence in the economy such as the time that we experienced from 2008, and beyond, what would it be?

Dr. Green.

Mr. GREEN. Since I am not an economist, macro, micro, or otherwise, this is a personal opinion, and there are—there were different ways—was it legitimate for the government to step in? Probably so. I am actually not anti-government. I think government is widely important. It is like fire. It is a necessary thing. It is great in the fireplace, it is wonderful on the stove, it is not so good on the carpets and on the drapes.

But there are different ways that I think it could have been implemented that I would have preferred, which is why I didn't support it.

Ms. EDWARDS. Thank you. Dr. Bivens, is there an appropriate time when the government should intervene in cases of high unemployment and collapse of confidence in the market?

Mr. BIVENS. Absolutely. I mean, in specific over the past couple of years why it was so appropriate for the American Recovery Act to be passed is because our primary tool for fighting recession is Federal Reserve Policy, had already pretty much maxed out its conventional ammunition. There was very much little extra the fed could do, something else had to come in and try to support the economy. That is what made it so appropriate in this context.

Ms. EDWARDS. And so you come to a conclusion in your testimony that jobs were created, the economy was stabilized. How do you know that? From an economic perspective and from an evaluation perspective. How do you know that?

Mr. BIVENS. I reference the sort of consensus among forecasters, and that is not evidence in and of itself, but what it reflects is that there is a lot of strong evidence underlying it.

One is just the timing of the act. It works very well when the downward spiral was arrested. Two, you do economic simulations where you try to construct, and this is what the Council for Economic Advisors did when they did their quarterly reports on the Recovery Act, and you can get a baseline path of how the economy would have done given the trajectory of economic variables as the crisis hit and then see how it actually did do relative to that counter-factual baseline. And then, three, you know, you use the multipliers that have gotten such a bad name in this debate, you know, given the amount of spending on food stamps or public sector investment. People act like these multipliers come from thin air. They don't come from thin air. They come from lots and lots of empirical research of the affect of government spending in environments like we saw in 2008, that is when the interest rate is at or zero-lower bound, when you have got the threat of deflation in those environments, past government spending has provided very large multipliers. That is where those come from. So that is where I got those.

Ms. EDWARDS. Thank you, and then lastly, Mr. Kovacs, can you imagine an environment today in which we wouldn't have done the—passed the Recovery Act and what that would mean to the businesses that you represent?

Mr. KOVACS. Well, actually, I think we, as the Chamber put it, an enormous amount of constructive thought into trying to work with Congress. One of the provisions that we had been lobbying for was what Senators Barrasso and Boxer put in, which was the way that you have to treat NEPA. In other words, it has to be handled in the most expeditious way possible, and we had no idea how many projects were really going to be impacted, but we knew there weren't that many shovel-ready projects.

In the end according to the Administration that provision was used over 180,000 times, so we think that we added to really making the act work.

Ms. EDWARDS. Thank you, Mr. Chairman.

Chairman BROUN. Okay. The—I guess, Mr. Miller, you are recognized for five minutes. I was just looking around to see who was here, so you are recognized for five minutes. Congressman Miller, you are recognized for five minutes.

Mr. MILLER. All right. Thank you. Dr. Green, you just a moment ago said that you are not an economist macro and micro. Actually my information is that your Ph.D. is in environmental science and engineering. You have a B.S. in biology and a Master's in molecular genetics.

Did you take macro and micro in college?

Mr. GREEN. Yes, sir. Yes, Congressman. As part of my doctorate at UCLA, the program I was in was an inter-disciplinary and policy-oriented doctoral program in which we had a core course on decision-making theory that included economics.

Furthermore, I have worked at and with economists now for 16 years, including for three years editing a journal on the think tank that was primarily economic studies. So I am not an economist, but that does not mean I am not versed in economics.

Mr. MILLER. Okay, but you don't have an academic credential that would—you would not be qualified to peer review for a peer-reviewed economics journal, would you?

Mr. GREEN. I believe I have, but I will leave that to your judgment.

Mr. MILLER. Okay, but all of your testimony today is on economics. Correct?

Mr. GREEN. Essentially. Yes.

Mr. MILLER. Okay. In the three studies that you refer to are all economic studies. Isn't that correct?

Mr. GREEN. Yes.

Mr. MILLER. Okay. Do you know if those studies were peer reviewed?

Mr. GREEN. I am not aware of whether they were peer reviewed or not, but then, again, I don't hold a peer review as a particular guarantor of accuracy, and that has been clearly documented in the university.

Mr. MILLER. Okay. Do you know if those studies have been criticized by other economists as methodologically unsound?

Mr. GREEN. Well, yes, naturally. I mean, all studies in this area are criticized, including——

Mr. MILLER. Isn't that one of the reason for peer reviews is to have a discussion back and forth between those who are familiar with methodology about whether the studies are methodologically sound?

Mr. GREEN. Sure, and my guess is, yes, they actually did consult with their peers to have their research findings checked.

Mr. MILLER. Okay.

Mr. GREEN. However, even peer-reviewed studies are a source of debate. Look at the IPCC, look at all the studies——

Mr. MILLER. Do you know the extent to which—do you know if they got any funding from the fossil fuel industries?

Mr. GREEN. I have no idea what their sources of funding are.

Mr. MILLER. You don't know that they did?

Mr. GREEN. I don't know what their sources of funding are at all.

Mr. MILLER. Okay. You are a fellow at the American Enterprise Institute. You say that you are here expressing your own opinion. I assume you are not on unpaid leave today, and in fact, if we look at the website for AEI in a few days they will probably tout your testimony today as a credential for you.

Tell us what support AEI gets from the fossil fuel industry.

Mr. GREEN. Well, first to correct the record, I am a resident scholar at AEI.

Mr. MILLER. Okay.

Mr. GREEN. It is an arbitrary distinction or distinction that only matters inside, but for the record that is the case.

I have no idea to tell you the truth what the fossil fuel industry donates to AEI. The scholars are walled off from the fundraising process entirely, and I couldn't begin to tell you.

Mr. MILLER. Okay.

Mr. GREEN. Or any other donor to AEI.

Mr. MILLER. All right. Dr. Bivens, are you familiar with the three studies that Dr. Green wrote about?

Mr. BIVENS. I am familiar with two of the three, the Spanish and Italian, but I have not read the Scottish one.

Mr. MILLER. Okay. What—you presumably are qualified to peer review them as an economist. What is your peer review?

Mr. BIVENS. I think they are pretty bad. I mean, essentially they compare the labor intensity of jobs supported by green investments versus some economy-wide average, and because the labor intensity is lower, they decide that money could be more profitably spent somewhere else in the economy.

I mean, that is ridiculous. If you just look at jobs in the utility sector in the United States today, they are not labor intensive at all. It is not a real shock, you know. These are very capital-intensive industries, so the idea that you could somehow just stop spending on utilities in the U.S. economy today and devote the money to other activities and create more jobs that the utility sector is killing jobs, that is an insane way to think of the issue.

So basically they have come up with the blockbuster finding that utilities are not very labor intensive, which was not a surprise to anyone.

Mr. MILLER. Okay. A lot of the testimony today has been that government support distorts the market, and I see some heads nodding yes, that is correct. That is what your testimony is, that presumably if government is supporting something in one way, presumably alternative energy is in competition with coal, with oil and gas, with nuclear, and by supporting alternative energies, it distorts what the market would otherwise do.

Since 1948, there has been $91 billion in funding for nuclear energy. Excuse me. There has been a total of—that is correct. Ninety-one billion for nuclear energy, 46 billion for fossil energy, and 11 percent or 21 billion for alternative energy. That is wind and solar and everything else together.

Has that distorted the marketplace at all? Mr. Green. Dr. Green.

Mr. GREEN. I would like to say, first of all, one has to keep these things in perspective. When you look at subsidies per megawatt hour, you do not see a dominance in the oil and petrochemical sector.

I testified before I believe all subsidies distort markets and all subsidies in the energy field, in the markets should be removed to everyone, fossil fuels, nuclear power, wind, solar, alternative, battery technology. It doesn't really matter.

Mr. MILLER. Mr. Kovacs, do you have an opinion on this?

Mr. KOVACS. I mean, look. We have, you know, we have generally supported the advancement of technology at various stages. We for years have supported the advancement and the funding of all the technologies in the Energy Policy Act of 2005, 2007. We believe that one of the ways to begin addressing some of the issues that we have in this country is through technology, and obviously funding is a part of it.

You know, to that extent we have supported it, and I think in the end one of the things we are here today to talk about is to say, okay, it seems as though the climate has changed, we have borrowed a lot of money as a Nation, and we are here to try to give ideas as to how we might cooperate and do both energy efficiency, promote technology, and have it done through the private sector.

So, but, yes, we have always supported the technology efforts.

Mr. MILLER. My time has expired, Mr. Chairman.

Chairman BROUN. Yes, it has, but if you would like to ask an economist, Dr. Montgomery, those economic questions you asked of the other witnesses, I will be glad to give you a few more minutes for Dr. Montgomery to answer.

Mr. MILLER. Which ones particularly do you want to——

Chairman BROUN. Well, you asked an economist whether they were—Dr. Montgomery is an economist if you want to ask him the question about investment.

Mr. MILLER. Well, certainly.

Chairman BROUN. I would be glad to give you extra——

Mr. MILLER. Dr. Montgomery, well, do you agree that government support, subsidies, whatever, distorts the marketplace, the decisions that we made in the marketplace or otherwise?

Mr. MONTGOMERY. Yes, I do, and in particular I think that the—yes, and that there is a difference between distorting the marketplace and intervening in order to deal with true externalities like environmental protection. And I was trying to make that distinction in my testimony and rapidly in my five minutes, that it is a perfectly legitimate role and something which we have done quite successfully in many areas to establish cost-effective regulations that deal directly with emissions.

Like the Title IV Sulfur Program under the Clean Air Act. That is the right way to direct technology into cleaner energy because it deals with the emissions. Where the distortions come in is when the government picks the technologies by funding the technologies directly rather than concentrating on what the consequences of the technologies are and letting nuclear renewable energy, natural gas, and others fight it out on a level playing field to see which one has the best way of meeting the environmental goals.

Mr. MILLER. Okay. How about the ultra deep water and unconventional natural gas and other Petroleum Research Fund? Does that fall within that—that doesn't seem to have anything to do with the environment. It seems to be simply with doing the research to—how to drill down to two miles.

Mr. MONTGOMERY. I think the other part of my testimony was that there is a general market failure in R&D which leads to a lack of adequate investment across the board in the economy, including in the energy sector in the basic and applied research that provides new ideas on which innovations are built.

Now, I don't know whether that particular fund is doing that kind of basic and applied research or is doing something that the oil industry could have done perfectly well all by itself without having that money put into it.

But I would call that spending on technology development that may or may not be justified, depending on whether it is at the basic research end of the scale where government has an appropriate role.

Chairman BROUN. The gentleman's time has expired. Just in fairness.

The gentlelady, Ms. Lofgren, you are recognized for five minutes.

Ms. LOFGREN. Thanks very much. You know, I come from Silicon Valley where the tech sector is very excited about clean energy. I mean, it is not just the government programs that has given a tiny leg up to the industry but also the venture capital world. That is the biggest area of new growth, and people believe in business and also in the academic world that this has a tremendous future, not only in energy production but clearly in terms of job creation, and it is the next big thing that we don't want to miss out on.

And as I review the testimony today, I do have a concern. There seems to be a questioning of government investment in clean energy and green jobs. Now, Mr. Miller mentioned the disparity in terms of research dollars which the Congressional Research Service has advised us of with most of the money going into nuclear and the most of the rest going into fossil and really just a small percentage going into clean energy, but I think that is part of the story.

We have, and I have heard no willingness on the other side of the aisle to take a look at the tax breaks that we are giving in the fossil fuel arena, especially to oil companies.

Dr. Bivens, it seems to me if you add in the disparity in research funding with the tax breaks given to oil companies that nobody apparently is talking about repealing, you know, what does this do to the kind of a level playing field for the clean energy industry? Doesn't it make sense when we are subsidizing the oil industry and when we are disproportionately funding nuclear and fossil fuels to at least provide some assistance to this fledgling part of the energy economy, the high-tech sector?

Mr. BIVENS. Yeah. I mean, I would say I am not an expert on exactly how much in the way of benefits the fossil fuel industry gets, but I think your point is a good one, and I would add, you know, that besides the direct benefits, subsidies, tax breaks going to the fossil fuel sector, I think the single biggest subsidy is our failure to price emissions that are harmful to other economic stakeholders. That is a huge subsidy, and so I think until we correct that one, we are just not giving the private sector near enough incentive to do the green investment on its own, so I think public sector incentives to give that, give those incentives are a very good way to go.

Ms. LOFGREN. I was interested in Dr. Montgomery's comment in the exchange with Mr. Miller about the value of regulation to set standards that then people or industries will work to. I am wondering the Governor of California just upped the renewable energy portfolio requirement to a third today, and what I hear from industry is that if they know what it is they are supposed to do, they can do it. But what they need is some standards and what are the rules, and would you support, would you think that that would help? What California is doing?

You know, our energy consumption has remained flat while the population has grown about 25, 30 percent.

Mr. MONTGOMERY. I have done a lot of work on California's AB–32 implementation, so I will resist the temptation to talk about all of it.

Ms. LOFGREN. Thank you.

Mr. MONTGOMERY. I think the clean energy standard is a good example of a program which actually increases the cost of achieving the actual environmental objectives, and this is something we discussed at great length with the Air Resources Board and with the Economic and Allocation Advisory Committee. Larry Gould who chairs it from Stanford. That a cap-and-trade program in California would have been sufficient to achieve the goals of AB–32.

Adding the Clean Energy Standard to it serves only to limit the choices that utilities have for what kind of energy they are going to use to meet that standard, and it forces utilities to bear more of the burden.

Ms. LOFGREN. It is interesting, if I can, I have limited time, I don't want to be abrupt or rude, but the utilities certainly don't feel that way. In fact, PG&E which is the major utility and is the utility in my part of the State, pulled out of the Chamber of Commerce when they didn't support the cap-and-trade bill that the Congress had.

Dr. Bivens, do you share that point of view? I mean, not that California is so perfect, we have our challenges, but from an energy point of view we are making tremendous progress.

Mr. BIVENS. That general point of view that California has been a real leader in keeping energy consumption down relative to the rest of the country, absolutely, and I will say, you know, I bet I could construct an absolutely platonic, perfect energy policy that follows textbook economics and gets us to exactly where we need to go. That is not the world we live in. I mean, right now we have just got the market failing every day to put a price on emissions that harm other economic stakeholders, and so we should find a second best way to do the job until we get the platonic ideal.

Ms. LOFGREN. Well, I think that is correct, and certainly the State of California has set the standard in many ways by setting fuel efficiency standards when the Nation would not, and because it is such a large market, it actually did move fuel efficiency in the Nation, and we are doing the same thing with air quality, energy consumption, renewable uses, and the like.

I want to just switch briefly because I am almost out of time to the role of basic science research, which there is no way industry has the funds to do that kind of pre-competitive pre-commercial research, and I have a very deep concern that if we don't do adequate investments in basic research, university-based, or in the national labs, that we are going to have a big problem in the future and specifically some of the reductions that are being proposed, for example, the Stanford Linear Accelerator, which is doing X-ray photography in a way where they will actually be able to see at a molecular level photosynthesis, which has tremendous potential in terms of energy.

What is your take on the budgets, budget discussions on basic research, Dr. Bivens? What would those cuts do for our future competitively from a jobs point of view and from an energy point of view?

Mr. BIVENS. Yeah. I pretty much totally agree with you. I think cutting investments in basic research and a rush to budget austerity is kind of the definition of penny wise, pound foolish. I just don't think we should do it.

Ms. LOFGREN. Dr. Montgomery, do you have a point of view on that?

Mr. MONTGOMERY. Yes, I absolutely agree. In fact, that was what I put into my opening statement to try to emphasize it more than my written testimony did. Absolutely that the highest—that as you look at cutting the budget, it is very important that you protect the level of funding that we are now putting into basic energy research, not let it get cut.

The problem is that it has generally been starved by Congress in order to continue funding the subsidies and deployment of existing technologies, and that is because of the jobs that that creates. I think we have to——

Ms. LOFGREN. Well, there are jobs in basic science research, too.

Mr. MONTGOMERY. There are, and that is just fine, but don't lose sight—but don't concentrate so much on jobs that you put money into things instead of basic.

Ms. LOFGREN. I think we are the richest country in the world. We can do both, and I yield back.

Chairman BROUN. The gentlelady yields back.

Now, the chairman recognizes Mr. Hultgren for five minutes.

Mr. HULTGREN. Thank you, Mr. Chairman. Just a couple of questions, and I am sorry, there is a couple different committees meeting the same time, and I wish I could have been here for the whole time, but we will spend more time going over your testimony and things, but I did want just some clarification if I could.

And I guess I will, Dr. Montgomery, if I can address this to you at first, the Administration has made a high profile effort to invest a significant amount of taxpayer money on green jobs. How should Congress evaluate various job creation proposals? Any suggestions that you would have for us?

Mr. MONTGOMERY. Yeah. I would say ignore everything anybody says about jobs. You should be evaluating programs on their merits in terms of what do they cost, how do they address a specific externality or public policy problem, are they going to be increasing or reducing the cost of energy. The jobs calculation I think is—the jobs argument is pure smokescreen. Everybody can argue that they are going to be creating jobs if you give them money or losing jobs if you don't give them money. You have to actually look at the merits of what the money is doing.

Mr. HULTGREN. Mr. Kovacs, would you agree with that, and I guess just kind of a follow-up question. What is the appropriate cost that we should expect to pay? You know, is it $100,000 per job or $1 million per job or $10 million per job? Where do we start making a decision that this is too much, it is not being effective?

Mr. KOVACS. Well, our research doesn't confirm or deny any of that, but what it does state factually was that at least in March of 2010, there were 351 developers around the United States who were willing to put in $570 billion in direct investment that would have created roughly about $1.1 trillion as you have the multiplier effects with about 1.9 million jobs.

And what we are trying to say is the thing that held up that investment was the fact that departments were challenged and challenged and challenged, and if you—the goal isn't necessarily an environmental goal because every kind of facility was challenged, and 40 percent of the facilities that were challenged were all renewables. And there are 24 nuclear and I forget how many transmission, which would actually take the renewable power from the plains into Minnesota or Chicago.

So you have a pot of money, and you have developers who are willing to risk their money to build these facilities. So the easier way to do it is to let the private sector do it, and the market will begin to sort itself out. Some will get permits, some won't, but even if you took just one facility per state, you still get to about $400 billion in direct investment. That is needed at this time.

Mr. HULTGREN. Thanks, Mr. Kovacs, and I agree. It frustrates me when I see sometimes we are picking winners and losers or pushing an agenda that the market just doesn't want, and you know, there are some issues there I think that—so I appreciate your input there.

Dr. Green, if I could ask you, would you—are there other federal efforts that could be more efficient—that could just work more efficiently to help unemployed American and also stimulate the growth of the green economy? Are there things that you see that we could be focusing on that you would recommend?

Mr. GREEN. I lack the hubris to make suggestions like that. That would be better asked of someone who was more focused on sort of how economic stimulus works. I can recommend any of our economists at AEI for that.

Mr. HULTGREN. Great. I will move right next door if I could with that question, Dr. Kreutzer. If you have any suggestions, are there things, you know, federal efforts that could be more efficiently used to help people who are unemployed other than some of these green jobs initiatives?

Mr. KREUTZER. Yeah. Well, let's look at some of the things. First of all, we could have a separate discussion about the general benefit of federal funding of research, but the Stimulus Package doesn't fit that. We are trying to promote the economy. In the Stimulus Package they had a carve out of $140 million for climate data modeling. I checked with climatologists. They didn't know any unemployed climate data modelers.

We had a $5 billion program for weatherization. The state auditor in New Jersey, Stephen Eells, looked at the money that was being spent in New Jersey. Five percent of the funding was spent documented on nothing, close to ten percent they couldn't even tell where it had been spent, eight percent was overspent. They spent, you know, $22 on a light bulb that cost $1.50.

In short, out of 5 billion if you use that ratio, 1 billion is wasted. So you could do a lot better stimulus with the economy by not wasting billions of dollars by not ramping up money for people that are already employed.

When it comes to the impact, there was a debate earlier on whether we had the studies that Dr. Green cited were peer reviewed, as though they didn't matter if they weren't, but here is a statement from the Congressional Budget Office, okay, last year on the impact of policies to reduce greenhouse gas emissions on employment. This is a quote. "In particular, job losses in the industries that shrink would lower unemployment, excuse me, would lower employment more than job gains in other industries would increase employment, thereby raising the overall unemployment rate."

So it is not fossil fuel funded researchers that are coming up with this. This is very general, consistent from economists. We had a panel at the Heritage Foundation in September of 2009. We had economists from the EIA, we had economists from the EPA, we had economists from the Congressional Budget Office, we had economists from the Brookings Institution. All of them analyzing the employment and the simulative impact of Waxman-Markey. None of them found that it stimulated the economy.

The debate was entirely over how much did it cost. Nobody found economic growth from that. The question is is it worth that? That is a reasonable debate to have, but you can't pretend that it is free.

Mr. HULTGREN. I am out of time. Thank you very much. I yield back.

Chairman BROUN. The gentleman's time has expired.

I want to thank the witnesses for you all's valuable testimony here today. It has been very enlightening, and I thank the members for your questions.

Members of the subcommittee have additional questions for the witnesses, and I will ask all of you all to respond to those questions in writing. The record will remain open for two weeks for additional comments from members, and if you would, please get those answers in writing back to us within that two-week period.

The witnesses are excused and——

Ms. EDWARDS. Mr. Chairman, I just have a question. I would ask unanimous consent that we be allowed to include materials for the record that were shared with the majority staff prior to the hearing.

Chairman BROUN. Okay. I think that has been agreed to. So ordered.

Ms. EDWARDS. Thank you.

[The materials follow:]

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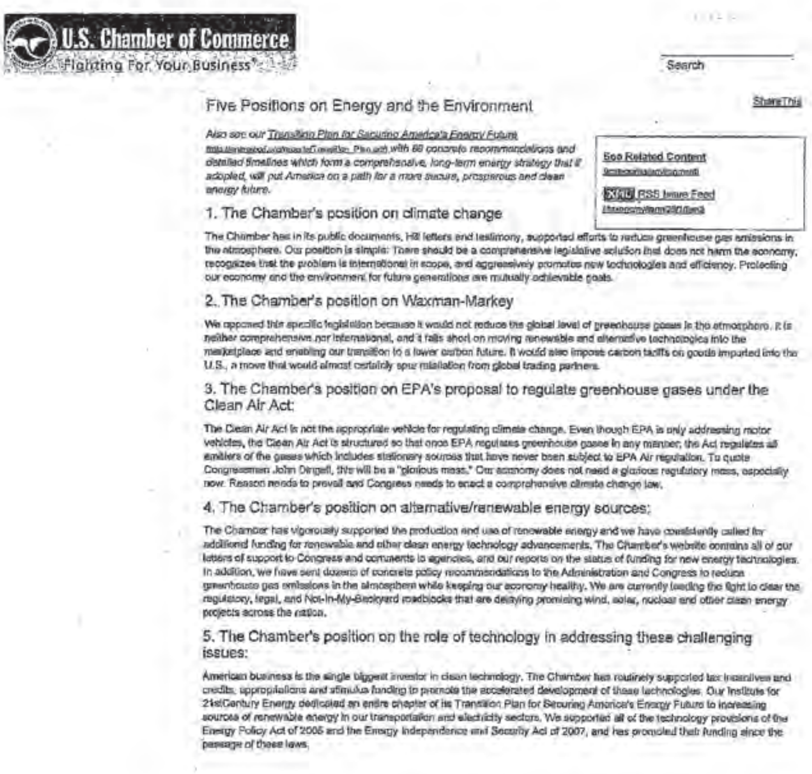
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1. The Chamber's position on climate change

The Chamber has in its public documents, Hill letters and testimony, supported efforts to reduce greenhouse gas emissions in the atmosphere. Our position is simple: There should be a comprehensive legislative solution that does not harm the economy, recognizes that the problem is international in scope, and aggressively promotes new technologies and efficiency. Protecting our economy and the environment for future generations are mutually achievable goals.

2. The Chamber's position on Waxman-Markey

We opposed this specific legislation because it would not reduce the global level of greenhouse gases in the atmosphere. It is neither comprehensive nor international, and it falls short on moving renewable and alternative technologies into the marketplace and enabling our transition to a lower carbon future. It would also impose carbon tariffs on goods imported into the U.S., a move that would almost certainly spur retaliation from global trading partners.

3. The Chamber's position on EPA's proposal to regulate greenhouse gases under the Clean Air Act:

The Clean Air Act is not the appropriate vehicle for regulating climate change. Even though EPA is only addressing motor vehicles, the Clean Air Act is structured so that once EPA regulates greenhouse gases in any manner, the Act regulates all emitters of the gases which includes stationary sources that have never been subject to EPA Air regulation. To quote Congressman John Dingell, this will be a "glorious mess." Our economy does not need a glorious regulatory mess, especially now. Reason needs to prevail and Congress needs to enact a comprehensive climate change law.

4. The Chamber's position on alternative/renewable energy sources:

The Chamber has vigorously supported the production and use of renewable energy and we have consistently called for additional funding for renewable and other clean energy technology advancements. The Chamber's website contains all of our letters of support to Congress and comments to agencies, and our reports on the status of funding for new energy technologies. In addition, we have sent dozens of concrete policy recommendations to the Administration and Congress to reduce greenhouse gas emissions in the atmosphere while keeping our economy healthy. We are currently leading the fight to clear the regulatory, legal, and Not-In-My-Backyard roadblocks that are delaying promising wind, solar, nuclear and other clean energy projects across the nation.

5. The Chamber's position on the role of technology in addressing these challenging issues:

American business is the single biggest investor in clean technology. The Chamber has routinely supported tax incentives and credits, appropriations and stimulus funding to promote the accelerated development of these technologies. Our Institute for 21stCentury Energy dedicated an entire chapter of its Transition Plan for Securing America's Energy Future to increasing sources of renewable energy in our transportation and electricity sectors. We supported all of the technology provisions of the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007, and has promoted their funding since the passage of these laws.

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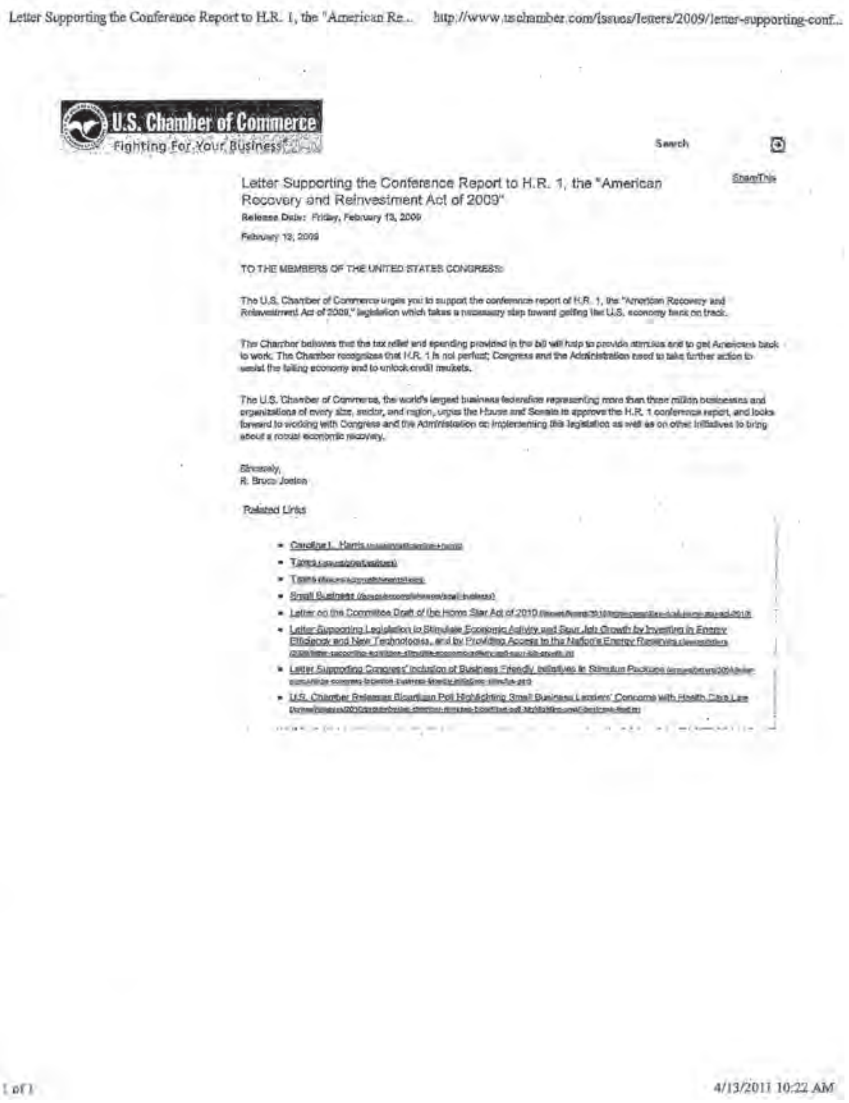

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Letter Supporting the Conference Report to H.R. 1, the "American Recovery and Reinvestment Act of 2009"

Release Date: Friday, February 13, 2009

February 13, 2009

TO THE MEMBERS OF THE UNITED STATES CONGRESS:

The U.S. Chamber of Commerce urges you to support the conference report of H.R. 1, the "American Recovery and Reinvestment Act of 2009," legislation which takes a necessary step toward getting the U.S. economy back on track.

The Chamber believes that the tax relief and spending provided in the bill will help to provide stimulus and to get Americans back to work. The Chamber recognizes that H.R. 1 is not perfect; Congress and the Administration need to take further action to assist the failing economy and to unlock credit markets.

The U.S. Chamber of Commerce, the world's largest business federation representing more than three million businesses and organizations of every size, sector, and region, urges the House and Senate to approve the H.R. 1 conference report, and looks forward to working with Congress and the Administration on implementing this legislation as well as on other initiatives to bring about a robust economic recovery.

Sincerely,
R. Bruce Josten

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- Letter Supporting Congress' Inclusion of Business Friendly Initiatives in Stimulus Package
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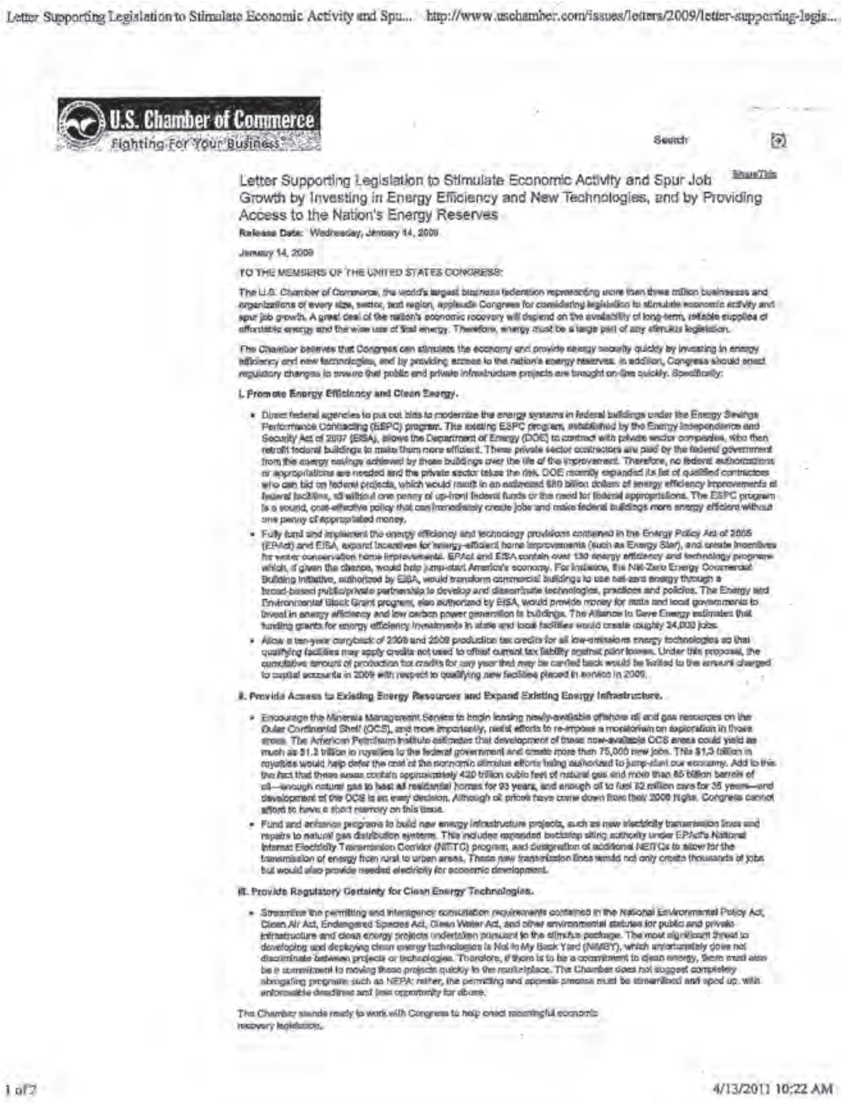

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Letter Supporting Legislation to Stimulate Economic Activity and Spur Job Growth by Investing in Energy Efficiency and New Technologies, and by Providing Access to the Nation's Energy Reserves

Release Date: Wednesday, January 14, 2009

January 14, 2009

TO THE MEMBERS OF THE UNITED STATES CONGRESS:

The U.S. Chamber of Commerce, the world's largest business federation representing more than three million businesses and organizations of every size, sector, and region, applauds Congress for considering legislation to stimulate economic activity and spur job growth. A great deal of the nation's economic recovery will depend on the availability of long-term, reliable supplies of affordable energy and the wise use of that energy. Therefore, energy must be a large part of any stimulus legislation.

The Chamber believes that Congress can stimulate the economy and provide energy security quickly by investing in energy efficiency and new technologies, and by providing access to the nation's energy reserves. In addition, Congress should enact regulatory changes to ensure that public and private infrastructure projects are brought on-line quickly. Specifically:

I. Promote Energy Efficiency and Clean Energy.

- Direct federal agencies to put out bids to modernize the energy systems in federal buildings under the Energy Savings Performance Contracting (ESPC) program. The existing ESPC program, established by the Energy Independence and Security Act of 2007 (EISA), allows the Department of Energy (DOE) to contract with private sector companies, who then retrofit federal buildings to make them more efficient. These private sector contractors are paid by the federal government from the energy savings achieved by those buildings over the life of the improvement. Therefore, no federal authorizations or appropriations are needed and the private sector takes the risk. DOE recently expanded its list of qualified contractors who can bid on federal projects, which would result in an estimated $80 billion dollars of energy efficiency improvements at federal facilities, all without one penny of up-front federal funds or the need for federal appropriations. The ESPC program is a sound, cost-effective policy that can immediately create jobs and make federal buildings more energy efficient without one penny of appropriated money.
- Fully fund and implement the energy efficiency and technology provisions contained in the Energy Policy Act of 2005 (EPAct) and EISA, expand incentives for energy-efficient home improvements (such as Energy Star), and create incentives for water conservation home improvements. EPAct and EISA contain over 130 energy efficiency and technology programs which, if given the chance, would help jump-start America's economy. For instance, the Net-Zero Energy Commercial Building Initiative, authorized by EISA, would transform commercial buildings to use net-zero energy through a broad-based public/private partnership to develop and disseminate technologies, practices and policies. The Energy and Environmental Block Grant program, also authorized by EISA, would provide money for state and local governments to invest in energy efficiency and low carbon power generation in buildings. The Alliance to Save Energy estimates that funding grants for energy efficiency investments in state and local facilities would create roughly 24,000 jobs.
- Allow a ten-year carryback of 2008 and 2009 production tax credits for all low-emissions energy technologies so that qualifying facilities may apply credits not used to offset current tax liability against prior losses. Under this proposal, the cumulative amount of production tax credits for any year that may be carried back would be limited to the amount charged to capital accounts in 2009 with respect to qualifying new facilities placed in service in 2009.

II. Provide Access to Existing Energy Resources and Expand Existing Energy Infrastructure.

- Encourage the Minerals Management Service to begin leasing newly-available offshore oil and gas resources on the Outer Continental Shelf (OCS), and more importantly, resist efforts to re-impose a moratorium on exploration in those areas. The American Petroleum Institute estimates that development of these now-available OCS areas could yield as much as $1.3 trillion in royalties to the federal government and create more than 75,000 new jobs. This $1.3 trillion in royalties would help defer the cost of the economic stimulus efforts being authorized to jump-start our economy. Add to this the fact that these areas contain approximately 420 trillion cubic feet of natural gas and more than 85 billion barrels of oil—enough natural gas to heat all residential homes for 93 years, and enough oil to fuel 62 million cars for 35 years—and development of the OCS is an easy decision. Although oil prices have come down from their 2008 highs, Congress cannot afford to have a short memory on this issue.
- Fund and enhance programs to build new energy infrastructure projects, such as new electricity transmission lines and repairs to natural gas distribution systems. This includes expanded backstop siting authority under EPAct's National Interest Electricity Transmission Corridor (NIETC) program, and designation of additional NIETCs to allow for the transmission of energy from rural to urban areas. These new transmission lines would not only create thousands of jobs but would also provide needed electricity for economic development.

III. Provide Regulatory Certainty for Clean Energy Technologies.

- Streamline the permitting and interagency consultation requirements contained in the National Environmental Policy Act, Clean Air Act, Endangered Species Act, Clean Water Act, and other environmental statutes for public and private infrastructure and clean energy projects undertaken pursuant to the stimulus package. The most significant threat to developing and deploying clean energy technologies is Not In My Back Yard (NIMBY), which unfortunately does not discriminate between projects or technologies. Therefore, if there is to be a commitment to clean energy, there must also be a commitment to moving these projects quickly to the marketplace. The Chamber does not suggest completely abrogating programs such as NEPA; rather, the permitting and appeals process must be streamlined and sped up, with enforceable deadlines and less opportunity for abuse.

The Chamber stands ready to work with Congress to help enact meaningful economic recovery legislation.

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Sincerely,
R. Bruce Josten

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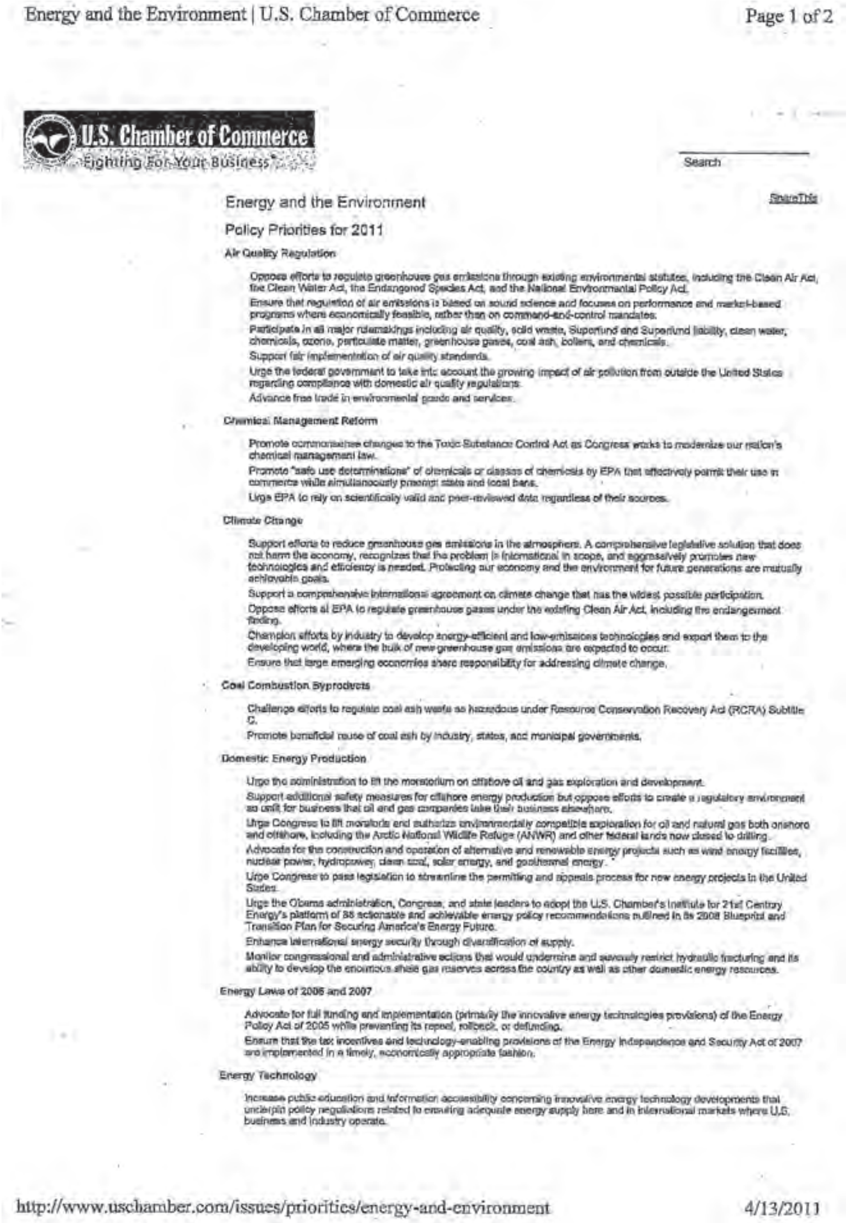

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Energy and the Environment

Policy Priorities for 2011

Air Quality Regulation

Oppose efforts to regulate greenhouse gas emissions through existing environmental statutes, including the Clean Air Act, the Clean Water Act, the Endangered Species Act, and the National Environmental Policy Act.

Ensure that regulation of air emissions is based on sound science and focuses on performance and market-based programs where economically feasible, rather than on command-and-control mandates.

Participate in all major rulemakings including air quality, solid waste, Superfund and Superfund liability, clean water, chemicals, ozone, particulate matter, greenhouse gases, coal ash, boilers, and chemicals.

Support fair implementation of air quality standards.

Urge the federal government to take into account the growing impact of air pollution from outside the United States regarding compliance with domestic air quality regulations.

Advance free trade in environmental goods and services.

Chemical Management Reform

Promote commonsense changes to the Toxic Substance Control Act as Congress works to modernize our nation's chemical management law.

Promote "safe use determinations" of chemicals or classes of chemicals by EPA that effectively permit their use in commerce while simultaneously preempt state and local bans.

Urge EPA to rely on scientifically valid and peer-reviewed data regardless of their sources.

Climate Change

Support efforts to reduce greenhouse gas emissions in the atmosphere. A comprehensive legislative solution that does not harm the economy, recognizes that the problem is international in scope, and aggressively promotes new technologies and efficiency is needed. Protecting our economy and the environment for future generations are mutually achievable goals.

Support a comprehensive international agreement on climate change that has the widest possible participation.

Oppose efforts at EPA to regulate greenhouse gases under the existing Clean Air Act, including the endangerment finding.

Champion efforts by industry to develop energy-efficient and low-emissions technologies and export them to the developing world, where the bulk of new greenhouse gas emissions are expected to occur.

Ensure that large emerging economies share responsibility for addressing climate change.

Coal Combustion Byproducts

Challenge efforts to regulate coal ash waste as hazardous under Resource Conservation Recovery Act (RCRA) Subtitle C.

Promote beneficial reuse of coal ash by industry, states, and municipal governments.

Domestic Energy Production

Urge the administration to lift the moratorium on offshore oil and gas exploration and development.

Support additional safety measures for offshore energy production but oppose efforts to create a regulatory environment so unfit for business that oil and gas companies take their business elsewhere.

Urge Congress to lift moratoria and authorize environmentally compatible exploration for oil and natural gas both onshore and offshore, including the Arctic National Wildlife Refuge (ANWR) and other federal lands now closed to drilling.

Advocate for the construction and operation of alternative and renewable energy projects such as wind energy facilities, nuclear power, hydropower, clean coal, solar energy, and geothermal energy.

Urge Congress to pass legislation to streamline the permitting and appeals process for new energy projects in the United States.

Urge the Obama administration, Congress, and state leaders to adopt the U.S. Chamber's Institute for 21st Century Energy's platform of 88 actionable and achievable energy policy recommendations outlined in its 2008 Blueprint and Transition Plan for Securing America's Energy Future.

Enhance international energy security through diversification of supply.

Monitor congressional and administrative actions that would undermine and severely restrict hydraulic fracturing and its ability to develop the enormous shale gas reserves across the country as well as other domestic energy resources.

Energy Laws of 2005 and 2007

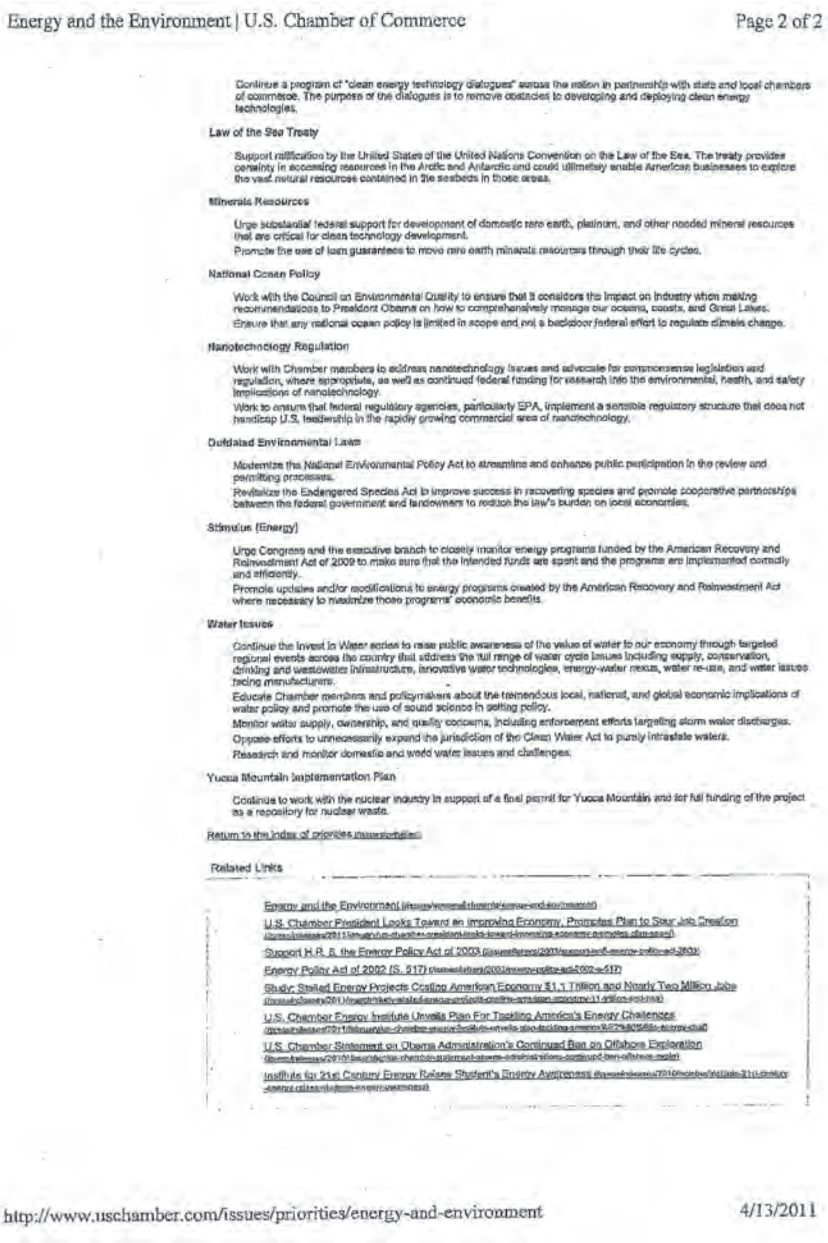
Advocate for full funding and implementation (primarily the innovative energy technologies provisions) of the Energy Policy Act of 2005 while preventing its repeal, rollback, or defunding.

Ensure that the tax incentives and technology-enabling provisions of the Energy Independence and Security Act of 2007 are implemented in a timely, economically appropriate fashion.

Energy Technology

Increase public education and information accessibility concerning innovative energy technology developments that underpin policy negotiations related to ensuring adequate energy supply here and in international markets where U.S. business and industry operate.

http://www.uschamber.com/issues/priorities/energy-and-environment 4/13/2011



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Continue a program of "clean energy technology dialogues" across the nation in partnership with state and local chambers of commerce. The purpose of the dialogues is to remove obstacles to developing and deploying clean energy technologies.

Law of the Sea Treaty

Support ratification by the United States of the United Nations Convention on the Law of the Sea. The treaty provides certainty in accessing resources in the Arctic and Antarctic and could ultimately enable American businesses to explore the vast natural resources contained in the seabeds in those areas.

Minerals Resources

Urge substantial federal support for development of domestic rare earth, platinum, and other needed mineral resources that are critical for clean technology development.

Promote the use of loan guarantees to move rare earth minerals resources through their life cycles.

National Ocean Policy

Work with the Council on Environmental Quality to ensure that it considers the impact on industry when making recommendations to President Obama on how to comprehensively manage our oceans, coasts, and Great Lakes.

Ensure that any national ocean policy is limited in scope and not a backdoor federal effort to regulate climate change.

Nanotechnology Regulation

Work with Chamber members to address nanotechnology issues and advocate for commonsense legislation and regulation, where appropriate, as well as continued federal funding for research into the environmental, health, and safety implications of nanotechnology.

Work to ensure that federal regulatory agencies, particularly EPA, implement a sensible regulatory structure that does not handicap U.S. leadership in the rapidly growing commercial area of nanotechnology.

Outdated Environmental Laws

Modernize the National Environmental Policy Act to streamline and enhance public participation in the review and permitting processes.

Revitalize the Endangered Species Act to improve success in recovering species and promote cooperative partnerships between the federal government and landowners to reduce the law's burden on local economies.

Stimulus (Energy)

Urge Congress and the executive branch to closely monitor energy programs funded by the American Recovery and Reinvestment Act of 2009 to make sure that the intended funds are spent and the programs are implemented correctly and efficiently.

Promote updates and/or modifications to energy programs created by the American Recovery and Reinvestment Act where necessary to maximize those programs' economic benefits.

Water Issues

Continue the Invest in Water series to raise public awareness of the value of water to our economy through targeted regional events across the country that address the full range of water cycle issues including supply, conservation, drinking and wastewater infrastructure, innovative water technologies, energy-water nexus, water re-use, and water issues facing manufacturers.

Educate Chamber members and policymakers about the tremendous local, national, and global economic implications of water policy and promote the use of sound science in setting policy.

Monitor water supply, ownership, and quality concerns, including enforcement efforts targeting storm water discharges.

Oppose efforts to unnecessarily expand the jurisdiction of the Clean Water Act to purely intrastate waters.

Research and monitor domestic and world water issues and challenges.

Yucca Mountain Implementation Plan

Continue to work with the nuclear industry in support of a final permit for Yucca Mountain and for full funding of the project as a repository for nuclear waste.

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Rebuilding Green

The American Recovery and Reinvestment Act and the Green Economy

Jason Walsh, Josh Bivens and Ethan Pollack

BLUEGREEN ALLIANCE

Economic Policy Institute

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EXECUTIVE SUMMARY

as we mark the second anniversary of the American Recovery and Reinvestment Act (ARRA or the Recovery Act), it is an appropriate time to evaluate the impacts of this landmark legislation. President Barack Obama signed the ARRA into law on February 17, 2009. It was a response to the great financial crash of 2008 that devastated the U.S. economy, destroyed millions of jobs, created millions more long-term unemployed, and forced a tax-payer bailout unparalleled in American history. The ARRA's enactment represented a dramatic attempt to resuscitate a U.S. economy in free-fall.

Two years later, the Recovery Act's public investments have not only saved and created millions of jobs, but have also represented an unprecedented down payment on the nation's emerging green economy. As outlined in this report, *Rebuilding Green: The American Recovery and Reinvestment Act and the Green Economy*, the success of that down payment makes a strong case for additional public investment in the green economy as a centerpiece of a national strategy to solve the continuing unemployment crisis.

This report, a joint effort between the BlueGreen Alliance and the Economic Policy Institute, takes a comprehensive view of the Recovery Act, examining the success of this legislation as a response to a major economic crisis, and more specifically, its success in creating and saving jobs through critical green investments.

The report finds that through the end of 2010, the Recovery Act:

- **Committed $93 billion in public investment to green economy activities across a** range of industry sectors.
- **Creates or saves nearly 1 million American jobs with this $93 billion investment.** These 997,000 jobs include both the "green jobs" created directly by investment in specific industries and indirectly by their suppliers, as well as the additional jobs created when workers spend their incomes back into the economy.
- **Provides jobs for some of the country's most vulnerable workers.** These include workers who have been on the losing end of structural trends in the labor market over the past generation—including those in the middle of the wage distribution and those with less than a four-year college degree.
- **Increases U.S. Gross Domestic Product (GDP) by $146 billion with its green economy investment.**

The report also examines the evidence on the *overall* effectiveness of ARRA in stemming the economic crisis, from its passage until the middle of 2010. This evidence demonstrates clearly that during this period ARRA:

- **Created or saved up to 3.4 million jobs;**
- **Boosted GDP by up to $520 billion;** and
- **Reduced the unemployment rate up to 1.8 percentage points.**

Rebuilding Green shows how the Recovery Act was designed as an effective response to the economic crisis that required confronting three intersecting challenges faced by the United States:

- **Transforming energy** – Our economy was designed to function in a world where fossil fuels are forever abundant and forever cheap. Today, as increasing demand for oil comes up against a dwindling supply, prices are rising to reflect that reality and are projected to continue rising;
- **Addressing climate change** – Climate change is upon us and is close to reaching a tipping point, with devastating consequences for the country's – and

the world's – ecological and economic systems; and

- **Restoring competitiveness** – In 2009 China took first place among G-20 countries for overall investment in clean energy, pushing the United State to second place. The U.S. is also lagging behind G-20 countries by other key indicators of clean energy competitiveness. In all of the countries outstripping the United States, domestic policy is spurring the rapid scale-up of their green economies, with national standards for renewable energy and energy efficiency and carbon pricing providing long-term market clarity, alongside other supports like low- or no-cost finance.

Rebuilding Green finds that aggressive investment in the green economy, starting with the down payment contained in the Recovery Act, confronts each of these challenges head-on by addressing pressing problems in the short-, medium-, and long-term:

- **In the short-term**, the transition to a green economy creates good jobs, provides workers with income that can be spent in the economy, and helps bring the overall unemployment rate down.
- **In the medium-term**, this job creation leads, in turn, to lasting wage growth, which re-orients the economy toward wage-led growth, rather than debt-led growth. Such a transition makes the distribution of economic rewards more equitable and leads to an economy less prone to risky and unregulated financial transactions. These medium-run benefits will move the U.S. economy down a path toward borrowing less from the rest of the world, thereby reducing our chronic trade deficit and positioning the country to be a leader in the new growth industries of the future.
- **In the long-term**, investments of this nature meet the most pressing challenge for the American and global economies: the need to transition to production that is far less carbon-intensive. Because green investments represent an increase in the nation's capital stock, there is no "crowding-out" of private sector investment. In fact, the Recovery Act's green investments are "crowding in" private sector investment by requiring co-investments, many of which would likely not have occurred otherwise in a low-performing economy. Thus, an aggressive green investment strategy plays a critical role in solving the long-run climate crisis in an economically beneficial way.

The report also details how the Recovery Act was designed to provide extraordinary fiscal support to prevent the economy from falling into a depression. The ARRA's support was divided among tax cuts, transfer payments to states and individuals, and infrastructure investment – with an emphasis on green infrastructure. It shows how the impact on the economy of the Recovery Act's tax cuts and transfer payments have largely run their course, whereas substantial new green investments are still coming on-line and boosting jobs, incomes and overall demand in an economy that still requires it.

In addition to documenting the jobs and economic impacts of the Recovery Act's green investments and overall spending, *Rebuilding Green* shows how green investments have been translated into economic activity in remarkably diverse ways, varying by program, industry sector and region of the country. These case studies attempt to capture some of this diversity and the successes and challenges of the Recovery Act's implementation, and in the process illustrate how green jobs are central to the overall economy and scalable *with the right policies.*

And while this report outlines the positive impact of the Recovery Act, as of December 2010, the U.S. economy still needs 11 million jobs to return unemployment to its pre-recession level.

Given this need, a smart policy path forward requires a national jobs plan utilizing strategies that are effective in spurring growth and employment. Further investments in green infrastructure would help catalyze a full economic recovery while building upon the foundation laid by the Recovery Act. Such investments would allow the United States to successfully confront the unavoidable long-term challenges of fossil fuel dependence and climate change and, in so doing, to win the most important world-wide economic development race of the 21st century.

Because green investments represent an increase in the nation's capital stock, there is no "crowding-out" of private sector investment. In fact, the Recovery Act's green investments are "crowding in" private sector investment by requiring co-investments, many of which would likely not have occurred otherwise in a low-performing economy.

INTRODUCTION

The American Recovery and Reinvestment Act (ARRA or the Recovery Act) was signed into law on February 17, 2009, passed as a response to what is now known as the Great Recession. Given that the Great Recession officially ended 20 months ago, in June of 2009, and that ARRA was designed to provide large-scale support to the economy for roughly two years, its second anniversary seems a reasonable time to step back and assess its impact.

The efficacy of ARRA is one of the most-debated topics in politics and economics in recent years. This report aims to summarize what is known about its impact on the economy and the jobs crisis that has continued well after the recession. We find that ARRA effectively provided the economic support promised by its architects in stimulating business and spurring employment. Besides highlighting its overall impact, however, this report also demonstrates how one key aspect of ARRA – its unprecedented investments in the green economy – should be examined to judge the true legacy it leaves behind.

While some of the largest outlays in ARRA have already run their course, the Act's green investments continue to impact the economy and provide job growth. We find that the green investments injected into the economy through December 2010 create or save just under 1 million jobs and increase GDP by $146 billion. We find that these jobs predominantly boost demand for workers without a four-year college degree – a group that has been in sore need of raises for most of the past couple of decades. We also note that the green investments are some of the largest parts of ARRA that are still filtering out into the economy and creating jobs, while many of the rest of the spending increases and tax reductions of the Act are winding down. (For more information on the job impacts of green investments, see page 18.)

We also review the evidence on the effectiveness of ARRA coming from both public and private evaluations. This evidence argues clearly that by the middle of 2010 ARRA created or saved up to 3.4 million full-time equivalent (FTE) jobs, boosted GDP by up to $520 billion, and reduced the unemployment rate up to 1.8 percentage points.

The overall economics of how ARRA supports economic activity are straightforward – the bursting of the housing bubble inflicted a huge negative shock to spending throughout the U.S. economy. When real estate prices plummeted both households and businesses radically cut back their demand for goods and services while new construction dried up and household wealth evaporated. ARRA helped fill in some of this spending gap, by having the public sector increase its purchasing as the private sector pulled back. In the very short-run, ARRA provided a variety of spending increases and tax cuts (the latter much more heavily weighted than realized by most).

ARRA did not simply throw money into the economy– many of the spending increases contained in it were targeted to meet one of the greatest challenges faced by the U.S. economy: the need to transition to a green economy that emits fewer greenhouse gases and averts catastrophic global climate change while positioning this country to win the most important economic development race of the 21st century. In essence, ARRA could be thought of as a large down payment on making the transition to a green economy for the United States.

Of course, like any down payment, the benefit is lost if future payments are not kept up. The ARRA started us down a path to a cleaner economy tomorrow, but we are far from there. Spurring further green investments should continue to be an important policy goal. Just like those contained in ARRA, further green investments will continue helping the economy recover from the worst recession since the Great Depression, will provide a more-solid foundation for growth and competitiveness in the medium-run, and will greatly ease the inevitable journey our economy (and the global economy) must make toward producing cleaner energy and emitting fewer greenhouse gases.

This report provides evidence that public investment in the green economy creates jobs. It details the economic, climate, and competitiveness crises facing the United States and how ARRA helped meet each one. It summarizes the evidence to date on its effectiveness in fighting the effects of the Great Recession, and highlights the specific use of green investments in this economic stabilization. It also examines the types of jobs likely created or saved by these green investments, and sketches out their implications for labor-market developments in coming years. Lastly, this report provides case studies of how the green investments contained in ARRA sparked or sustained multiple private- and public-sector initiatives to move toward a low-carbon economy that provides opportunity and quality jobs for working people.

THE CHALLENGES WE FACE

THE ECONOMIC CRISIS

The Great Recession had deep roots. During the 2001-07 business cycle, an underperforming labor market (employment grew 0.6% annually, two-thirds slower than the 1.8% annual growth in the previous cycle) failed to give typical working families any significant boost to earnings. Median family incomes were essentially flat between 1999 and 2007 – nearly a decade of stagnation.

In a development that seemed fortunate at the time, however, rapidly rising home prices in the 2000s allowed these households to afford the increase in living standards that their wage and salary incomes had not. By the peak of the housing mania, households were withdrawing home equity each year that equaled nearly 8% of total disposable household income – giving themselves an 8% raise through home equity that the job-market was not giving them through wage growth. In retrospect, of course, this was all unsustainable (although several economic commentators warned of this at the time, they were largely ignored by both finance professionals and policymakers. The marginalization of critics was no surprise – acting to keep the bubble from inflating to disastrous proportions would have required firm supervision of Wall Street, which would have run counter to the prevailing ideology arguing that finance was self-regulating).

Given the failure to overrule Wall Street and halt the bubble's inflation, the episode ended as badly as some had feared – plunging home prices from 2007 to 2009 destroyed trillions of dollars of household wealth, robbing households of purchasing power and also convincing them to start saving much more to pay for retirement and educational needs that they had once assumed would be met through the appreciation of their homes.

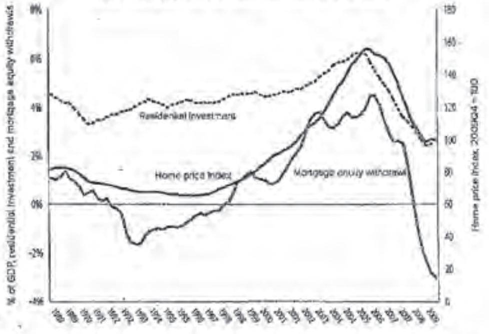
Furthermore, plunging home prices made builders realize that they had too large an inventory and that new home production would not be needed for some time, leading to a crash of the residential construction industry (the commercial building sector is also seeing a less-extreme dynamic of falling prices and reduced construction). (See figure 1)

Lastly, the enormous pullback in consumer spending robbed businesses of all kinds (not just construction companies) of potential customers. It also convinced these firms to put expansion plans on hold, leading to sharply falling rates of investment in equipment and software.

When the recession hit, the economy suffered a shock to *aggregate demand*, or consumer purchasing power. American workers did not lose their skills in December 2007, nor did American factories become obsolete that month, and American managers did not forget how to organize production. In short, there was no disruption to the American economy's ability to *supply* goods and services. Instead, the disruption was to American households' and businesses' desire and ability to *purchase* these goods and services – the rising housing wealth that had buoyed consumption for the 2000s had disappeared, taking purchasing power with it.

This initial demand shock quickly cascaded into reduced business investment in equip-

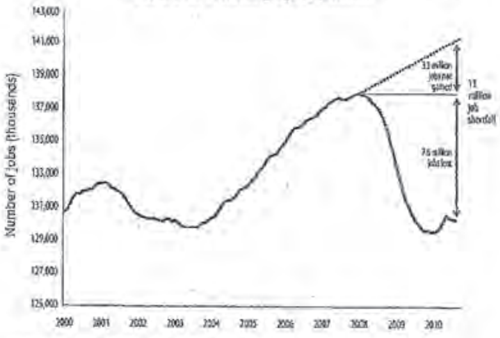
FIGURE 1. Home prices and residential investment and mortgage equity withdrawals as % of GDP



Source: Case-Shiller 20-city home index deflated by the PCE deflator, national income and product accounts (NIPAs) from the Bureau of Economic Analysis (BEA), and Federal Reserve Flow of Funds (FOF).

FIGURE 2. Recession has left in its wake a job shortfall of 11 million

Payroll employment and the number of jobs needed to keep up with the growth in working-age population



Source: EPI analysis of Bureau of Labor Statistics data

ment and software and led to budget crises in state governments, which saw revenues collapse due to lower incomes and higher spending for safety net programs. As nearly all state governments are required to balance budgets, this led to a policy response to cut spending and increase revenue, both of which further robbed demand from the economy.

By some estimates, the initial shock to demand spurred by the bursting housing price bubble was greater than the shock that led to the Great Depression. This was a shock that led to 2.2 million jobs being lost *just between November 2008 and January 2009* – essentially between President Obama's election and inauguration. And this was a shock that the American Recovery and Reinvestment Act was meant to counter.

Did it work? Yes, although the United States still suffered through the harshest recession since World War II. But ARRA made the situation much better than it otherwise would have been: the Congressional Budget Office (CBO) estimates that ARRA created or saved up to the 3 to 4 million jobs that were promised with its passage, and it kept the unemployment rate up to 2 percentage points lower than if it had not passed. (Later sections of this report will make the argument about ARRA's effectiveness in more detail.)

Despite ARRA's success, most forecasters, both public and private, do not forecast a sustained return to December 2007 rate until 2014 or even 2015. Furthermore, there are plenty of reasons to think that downside surprises could make it take even longer than that to reach unemployment rates near the pre-recession levels.[3] (See figure 2)

Additionally, each year that unemployment remains high relative to its full-employment potential is another year that will see sluggish (or even negative) growth in hourly wages and family incomes. The urgency remains for measures that will reliably create jobs and boost living standards. The investments still forthcoming from ARRA, particularly in areas that can create green jobs, will produce necessary economic benefits in the medium term. The more that such investments can be expanded through legislative action in the coming months, the more promising our economic recovery will be.

Lastly, a key challenge even when unemployment returns near to pre-recession levels is to build a better foundation for future economic growth. The foundation of the 2000s – consumer spending purchased by taking on ever-higher levels of debt – proved disastrous and should not be repeated. One way to ensure that a more-durable foundation underpins future growth is to base it less on consumption and more on investments (in both the private and the decades-neglected public capital stock), especially those that will ease the economy's transition to cleaner forms of energy.

THE ENERGY CRISIS

The need to make the transition to a low-carbon green economy could not be more urgent. Our economy is currently powered almost exclusively by fossil fuels, which supply 93% of the energy used in the United States. These are non-renewable resources and long-run supplies are limited, by definition. The more we consume, the less we have and the more it will cost us over time. The laws of supply and demand are pretty basic and make dwindling resources more and more expensive.[1]

Unfortunately, our economy was designed to function in a world where fossil fuels are forever abundant and forever cheap. Today, as those fuels – and especially oil – become increasingly scarce, prices are rising to reflect that reality. In the year 2000, a barrel of crude oil cost just under $40 per barrel. At the start of 2011 the cost was almost $90 per barrel in real dollars.[5] A dip at the height of the Great Recession was the only interruption to a decade of steadily rising prices.

And experts predict the cost will keep rising. The Energy Information Administration (EIA) estimates the price of West Texas Intermediate (WTI) crude oil – used as a benchmark in oil pricing – will average about $93 per barrel in 2011. For 2012, EIA projects WTI prices to continue to rise, with a forecasted average price of $99 per barrel by the end of the year. Gas prices at the pump will rise accordingly. EIA projects regular-grade gas retail prices to average $3.17 per gallon this year, 39 cents per gallon higher than last year, and $3.29 per gallon in 2012.[4]

The essential reason for this rise is that oil supplies can no longer keep pace with demand. This global demand is skyrocketing – especially from growing economies such as India and China. As both countries blossom into full-blown economic superpowers, energy demand from the Asian continent will only increase. On the supply side, oil companies are not finding significant new fields to keep pace with demand. Some experts even fear that global oil production has already peaked and that supplies are headed for a permanent, worldwide decline – even as demand goes up.

And while oil gets scarcer and more expensive, we import it from dangerously unstable countries. In November 2010, 40% of the 332 million barrels of oil that we imported were from the member states of OPEC, the four biggest being Saudi Arabia, Venezuela, Nigeria, and Algeria,[5] nations characterized by authoritarian governments, domestic unrest, terrorism, or an official policy of hostility toward the United States. Furthermore, our exposure to insecurity is even wider than our strict market share coming from these countries would indicate – the price of oil is set in global markets and the U.S. economy is effectively dependent on the marginal supplier to this global market. So long as the marginal supplier in that global market is a country with a problematic relationship to U.S. interests, then the case for ending this dependence is strong.

The bottom line: the days of cheap oil fueling our economy are over. At the same time, dependence on oil imports handcuffs our national interests in ways that make the real cost of oil even higher.

THE CLIMATE CRISIS

The real cost of dependence on fossil fuels rises higher still when factoring in the impact of their use on the natural systems that undergird our society and economy. Climate change – caused by rising emissions of carbon dioxide and other heat trapping gases, resulting primarily from human activity – is close to reaching a tipping point, with devastating consequences for the world's environmental and economic systems.

In 2009, a remarkable report, *Global Climate Change Impacts in the United States*, was released by a consortium of federal offices charged with integrating federal research on changes in the global environment and their implications for society. The report synthesized and summarized the 'state of knowledge' of the science of climate change and the impact of climate change in the United States, now and in the future. It exhaustively documented the fact that climate-related changes are *already* observed in the United States and its coastal waters. These include increases in heavy downpours, rising temperature and sea level, rapidly retreating glaciers, thawing permafrost, lengthening growing seasons and ice-free seasons in the ocean and on lakes and rivers, earlier snowmelt, and alterations in river flows. It projects global average temperatures to rise by up to 11.5° F by 2100 on our current emissions path, with devastating potential consequences in the United States, including wide-spread drought, flooding, crop failure, the inundation of coastal areas, and increased and multiplying risks to human health.[6]

The full human and environmental impacts of such climate-driven changes are increasingly well established. In addition, the strictly economic impacts are calculable to a degree of magnitude – and the data are startling. Economists at Sandia National Laboratories in New Mexico developed a macroeconomic model that estimates impacts on the U.S. economy of climate-driven changes in precipitation and water availability (the resulting drought effect, it should be emphasized, being one of several other climate-driven changes not incorporated into the modeling). The report estimates that net losses in U.S. gross domestic product (GDP) between 2010 and 2050 will reach as high as $1.9 trillion, and decreases in job-years range from 6.6 to 13 million.[7] The Sandia report joins a host of other studies that estimate the costs of inaction with respect to climate change. The most comprehensive of these is a review of the economics of climate change for the British Treasury overseen by Sir Nicholas Stern, which concluded that global warming may cost the world close to $10 trillion by the next century. The bottom-line of these reports: unmitigated climate change is a job-killer.

THE COMPETITIVENESS CRISIS

There is overwhelming evidence that climate change and over-dependence on fossil fuels hurts the United States. This is also true with respect to the competition for leadership in the global economy, given that the development and deployment of green technologies will likely be the most important global economic development race of the 21st century.

This reality is certainly realized by our biggest economic competitors, China foremost among them. In 2009 China took first place among

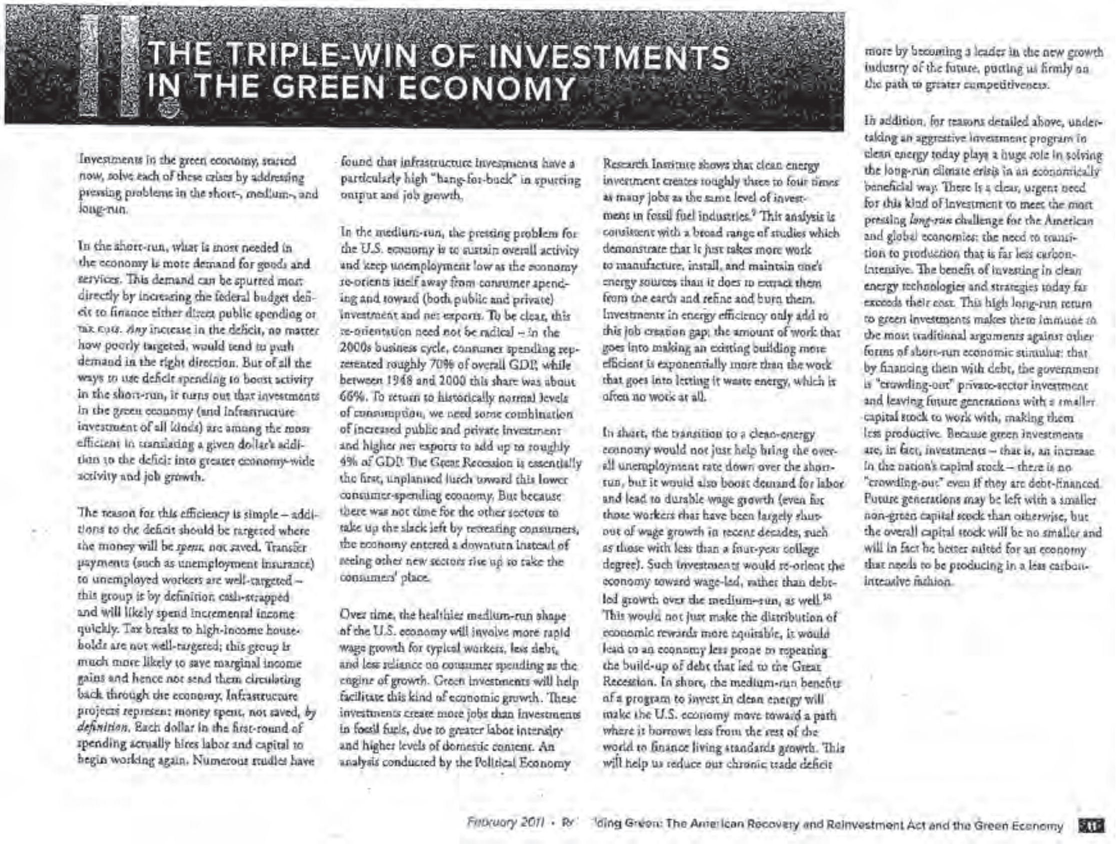
There is overwhelming evidence that climate change and over-dependence on fossil fuels hurts the United States. This is also true with respect to the competition for leadership in the global economy, given that the development and deployment of green technologies will likely be the most important global economic development race of the 21st century.

In all of the countries outstripping the United States, domestic policy acted as spur to investment, with national standards for renewable energy and energy efficiency and carbon pricing providing long-term market clarity and price signals, alongside other supports like low- or no-cost finance.

G-20 countries for overall investment in clean energy, pushing the United State to second place (the United States may have fallen further behind if not for the initial spend-out of ARRA investments). There were other measures of slipping international competitiveness in this key sector during 2009. In proportion to the size of their economies, Spain invested five times more and Brazil, and the United Kingdom invested three times more in clean energy than the United States. In all of the countries outstripping the United States, domestic policy acted as spur to investment, with national standards for renewable energy and energy efficiency and carbon pricing providing long-term market clarity and price signals, alongside other supports like low- or no-cost finance.[4]

Furthermore, given that the prime competitiveness problem facing the United States currently is the very large trade deficit in manufactured goods, letting a potential new growth industry that will demand many manufactured inputs be set up mostly abroad would be folly. The inputs to the new clean-energy economy will clearly be in concentrated in export sectors with very high rates of global demand growth, and thus could strongly ameliorate the U.S. trade deficit.

The trends of dwindling fossil fuel resources, rising global energy demand, and climate change are converging. Smart investors and entrepreneurs around the world recognize that this unprecedented intersection translates into clean energy being the most significant growth opportunity of the global economy. That is where these smart investors are putting their money and directing their innovation and business plans. National governments will squander competitive advantage if they fail to create certainty that such green investments will be able to compete on a level playing field going forward, and/or fail to provide the complementary public investments for transitioning to a clean-energy economy. If the United States is slow to act, it will not only hurt its own future economic performance and lose out on a most promising growth-sector of the future, it also will greatly slow down the race to avert catastrophic global climate change.



THE TRIPLE-WIN OF INVESTMENTS IN THE GREEN ECONOMY

Investments in the green economy, started now, solve each of these crises by addressing pressing problems in the short-, medium-, and long-run.

In the short-run, what is most needed in the economy is more demand for goods and services. This demand can be spurred most directly by increasing the federal budget deficit to finance either direct public spending or tax cuts. *Any* increase in the deficit, no matter how poorly targeted, would tend to push demand in the right direction. But of all the ways to use deficit spending to boost activity in the short-run, it turns out that investments in the green economy (and infrastructure investment of all kinds) are among the most efficient in translating a given dollar's addition to the deficit into greater economy-wide activity and job growth.

The reason for this efficiency is simple – additions to the deficit should be targeted where the money will be *spent*, not saved. Transfer payments (such as unemployment insurance) to unemployed workers are well-targeted – this group is by definition cash-strapped and will likely spend incremental income quickly. Tax breaks to high-income households are not well-targeted; this group is much more likely to save marginal income gains and hence not send them circulating back through the economy. Infrastructure projects represent money spent, not saved, *by definition*. Each dollar in the first-round of spending actually hires labor and capital to begin working again. Numerous studies have found that infrastructure investments have a particularly high "bang-for-buck" in spurring output and job growth.

In the medium-run, the pressing problem for the U.S. economy is to sustain overall activity and keep unemployment low as the economy re-orients itself away from consumer spending and toward (both public and private) investment and net exports. To be clear, this re-orientation need not be radical – in the 2000s business cycle, consumer spending represented roughly 70% of overall GDP, while between 1948 and 2000 this share was about 66%. To return to historically normal levels of consumption, we need some combination of increased public and private investment and higher net exports to add up to roughly 4% of GDP. The Great Recession is essentially the first, unplanned lurch toward this lower consumer-spending economy. But because there was not time for the other sectors to take up the slack left by retreating consumers, the economy entered a downturn instead of seeing other new sectors rise up to take the consumers' place.

Over time, the healthier medium-run shape of the U.S. economy will involve more rapid wage growth for typical workers, less debt, and less reliance on consumer spending as the engine of growth. Green investments will help facilitate this kind of economic growth. These investments create more jobs than investments in fossil fuels, due to greater labor intensity and higher levels of domestic content. An analysis conducted by the Political Economy Research Institute shows that clean energy investment creates roughly three to four times as many jobs as the same level of investment in fossil fuel industries.[9] This analysis is consistent with a broad range of studies which demonstrate that it just takes more work to manufacture, install, and maintain one's energy sources than it does to extract them from the earth and refine and burn them. Investments in energy efficiency only add to this job creation gap; the amount of work that goes into making an existing building more efficient is exponentially more than the work that goes into letting it waste energy, which is often no work at all.

In short, the transition to a clean-energy economy would not just help bring the overall unemployment rate down over the short-run, but it would also boost demand for labor and lead to durable wage growth (even for those workers that have been largely shut-out of wage growth in recent decades, such as those with less than a four-year college degree). Such investments would re-orient the economy toward wage-led, rather than debt-led growth over the medium-run, as well.[10] This would not just make the distribution of economic rewards more equitable, it would lead to an economy less prone to repeating the build-up of debt that led to the Great Recession. In short, the medium-run benefits of a program to invest in clean energy will make the U.S. economy move toward a path where it borrows less from the rest of the world to finance living standards growth. This will help us reduce our chronic trade deficit more by becoming a leader in the new growth industry of the future, putting us firmly on the path to greater competitiveness.

In addition, for reasons detailed above, undertaking an aggressive investment program in clean energy today plays a huge role in solving the long-run climate crisis in an economically beneficial way. There is a clear, urgent need for this kind of investment to meet the most pressing *long-run* challenge for the American and global economies: the need to transition to production that is far less carbon-intensive. The benefit of investing in clean energy technologies and strategies today far exceeds their cost. This high long-run return to green investments makes them immune to the most traditional arguments against other forms of short-run economic stimulus: that by financing them with debt, the government is "crowding-out" private-sector investment and leaving future generations with a smaller capital stock to work with, making them less productive. Because green investments are, in fact, investments – that is, an increase in the nation's capital stock – there is no "crowding-out" even if they are debt-financed. Future generations may be left with a smaller non-green capital stock than otherwise, but the overall capital stock will be no smaller and will in fact be better suited for an economy that needs to be producing in a less carbon-intensive fashion.

THE AMERICAN RECOVERY AND REINVESTMENT ACT

THE BASICS

While ARRA was first and foremost an emergency measure aimed to fill the hole in purchasing power left by the bursting housing bubble, the Obama administration also managed to use it as a vehicle to make a down payment on the investments needed to transition to a clean-energy economy.

The bursting bubble led to rapid reductions in both construction and consumer spending; these effects cascaded through businesses investment decisions (after all, who needs to build new factories when output from the current ones is sitting unsold) and ultimately led to a global recession, suppressing demand for U.S. exports as well. Given that the recession led to spending pullbacks from consumers and businesses, both domestic and foreign, the only spending that could hold the line on rapidly rising unemployment was that fueled by public funds.

The general case for using fiscal support to stabilize the economy

This view of recessions and the role of policies like the Recovery Act in fighting them is basic economics, but a kind that does not always make common sense. As private households and businesses reduce their spending and try to work off their overhang of debt, the only way to keep unemployment from spiking in the meantime is to have the public sector fill the gap by *increasing* its debt and using it to finance spending on safety net programs, investments, or tax cuts. Increasing public debt to cushion the economic shock of falling private debt just sounds wrong to many, but it is not. It is, in fact, the only way to hold the line on rising unemployment until the private sector has paid down enough of its debt to begin spending again.

One testament to the generic observation that rising budget deficits act as a shock absorber against collapsing private sector spending is the fact that essentially *no* professional economist criticized the increase in the budget deficit that arose *before* the passage of the Recovery Act; one can find *no* professional economist at the time arguing that policy should have kept the budget deficit from rising between January 2008 and February 2009. This mechanical rise in the deficit came about as tax collections followed incomes in plummeting as the recession gained steam and as safety net programs began paying out more as joblessness and underemployment rose. This mechanical rise in the deficit was a powerful buffer against the shock of the bursting housing bubble and is a key reason why a second Depression did not occur. And, again, this mechanical rise in the deficit was not decried by a single economist at the time.

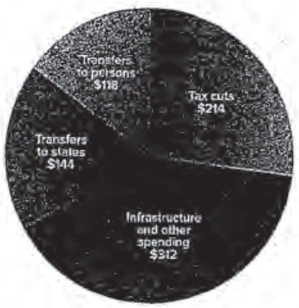
The Recovery Act – recognizing that extraordinary fiscal support was needed

The Recovery Act represented the correct assessment that the shock absorption provided by the purely *mechanical* rise in the deficit was too small (even when paired with the interest rate cuts undertaken by the Fed) to provide a quick recovery. So, the ARRA was constructed to provide an even larger cushion to the economy. Despite being premised on *exactly the same theory* as the rationale for automatic stabilizers, because it had a clear political sponsor (the Obama Administration), it became flypaper for criticism of all kinds.

One controversy surrounding the Recovery Act concerns the *composition* of the act, with many critics arguing that it was too heavily weighted toward spending at the expense of tax cuts to stimulate the economy. However, less than 40% of the Recovery Act's appropriations actually funded direct government spending. More than a quarter of the appropriations were for tax cuts (and even more than this in the first two years of the ARRA – many of the tax changes were deferments, so large tax cuts, especially for corporations, in the first two years are recouped later), while the remainder, roughly 35%, went to transfer payments to individuals (unemployment insurance, food stamps and other safety net programs) and states. (See figure 3)

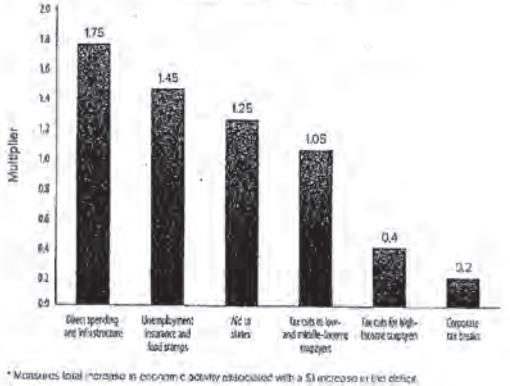
Besides just being wrong, this criticism about ARRA's composition is ironic given that most macroeconomic research indicates that tax cuts are actually far *less* efficient in generating output and jobs than direct government spending.

FIGURE 3. What was in the Recovery Act?
(Billions of dollars)



Source: Congressional Budget Office

FIGURE 4. What is the most effective stimulus?
"Bang-for-buck" multipliers*



* Measures total increase in economic activity associated with a $1 increase in the deficit

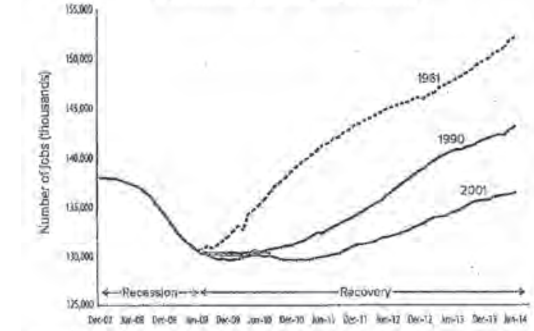
Source: Congressional Budget Office data

Compounding this irony, the tax cuts preferred by many of the Recovery Act's critics – those going to businesses – were far and away *the least effective* stimulus included in ARRA. Tax cuts are less efficient job-creators (especially those not targeted to lower-income households) because they may be saved instead of spent, and because many of the business tax cuts were essentially windfalls (often retroactive) that rewarded activity that would have been done (or had actually already happened) even without the Act.

On the other hand, safety net programs—such as unemployment insurance, nutrition assistance, and health insurance supports – are by definition well-targeted: they go to those families whose incomes have fallen below a threshold or who have recently suffered job loss. Consequently, recipients are much more likely to spend these payments – they have to. And in terms of making sure that all increases in public debt are spent, infrastructure spending is best of all – none of it can be saved; it all must be spent.

In essence, if Congress had included more tax cuts aimed at high-income households and businesses, the effectiveness of the Recovery Act would have been seriously reduced. It is confounding that some of ARRA's critics will argue in one sentence that the Act didn't go far enough, then in the next suggest it needed to contain more tax cuts, which would have only scaled back its effectiveness further. (See figure 4)

FIGURE 5. What will recovery look like?
Three possible paths to recovery: following the path of recoveries in the '80s, '90s, and 2000s



Source: EPI analysis of Bureau of Labor Statistics data

Is infrastructure investment "timely" enough to fight recessions?

Another criticism aimed at ARRA was that it outlaid money too slowly. Infrastructure investments in general are often criticized for not being "timely" enough to work well as anti-recession measures – the "timely" mantra was one reason, for example, why infrastructure investments were dismissed almost across-the-board by policymakers when the first stimulus package of January 2008 was debated and passed.[11]

Given the length of the Great Recession, and the projected time it will take even from today to reach full-employment, it seems safe to say that this argument can be put to rest: we are in no danger of starting infrastructure programs of any kind that will "miss" the economy's need for more demand. (See figure 5)

In regards to ARRA, this criticism of its untimeliness is particularly wrong given that its boost to economic growth had actually fallen to nearly zero by the last half of 2010 – just as economic growth was decelerating. In short, the biggest boost to the economy from ARRA has come and gone, and the need for more demand remains. This fade-out of ARRA's overall effect happened even as substantial new green investments were still coming on-line and boosting jobs and incomes.

The mechanics behind these two facts – that ARRA's overall impact is fading while valuable green investments are still coming on-line each day – is simple: the bulk of ARRA's *overall* spending and tax cuts were actually (and contrary to the "untimeliness" charge) quite front-loaded. Many of the tax cuts were largely spent in the first year of its implementation, and transfers to state governments and to households were often just a matter of expanding existing programs, so these started boosting purchasing power right away.

By 2011, however, many of these tax cuts and state transfers had started to expire (some of the transfers to households also expired, though the largest – the boost to unemployment insurance benefits – has been extended through 2011). Because the rate of spend-out from the ARRA was falling by the last half of 2010, its impact on growth was falling as well.

However, this falling rate of spend-out would be even greater if the green investments that continue to roll out each day were not still in the pipeline. While these green investments that continue to come on-line are not large enough to make up entirely for the massive withdrawal of ARRA's spending on transfers and tax cuts, they *do* still provide a real boost to the economy by cushioning the withdrawal of these other spending categories.

GREEN ECONOMY INVESTMENTS IN THE RECOVERY ACT

While any sort of direct government spending could have played a useful role in moderating the extent of the economic downturn, the architects of ARRA actually thought hard about not just putting people back to work, but also about what they would build and the legacy ARRA would leave to future generations.

As such, beyond its substantial achievement in moderating the rise in unemployment that would have happened absent its passage, the ARRA also represented an historic investment in the green economy. But determining how big an investment it was, and detailing those investments, begs definitional questions. How the green economy and green jobs should be defined has been the subject of a robust public debate since the terms first gained currency. A useful analytical framework was developed by authors writing on behalf of the Occupational Information Network (O*NET), which prepared a 2009 report for the U.S. Department of Labor entitled *Greening of the World of Work*. The report analyzes the impact of the growing green economy on occupational requirements and on the broader systems of industrial and occupational categorization used by workforce and economic developers to track industry demand for specific occupations. These systems, the North American Industrial Classification System (NAICS) and the Standard Occupational Classification (SOC) don't recognize separate "green" categorizations for either industries or occupations. Therefore, the report is necessarily cross-cutting in its approach, not least in the definition it offers of the 'green economy,' which spans multiple industries.

The green economy encompasses the economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy.[12]

The report goes on to identify 12 broad industry sectors that involve activities meeting this definition, including renewable energy generation, transportation, energy efficiency, green construction, environment protection, manufacturing, and waste reduction and recycling.

Building on this work, the Bureau of Labor Statistics defines green jobs as *either* jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources, *or* jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources. And BLS usefully emphasizes that green jobs are for the most part existing occupations, the "greenness" of which depends on the kind and degree of economic activity.[13]

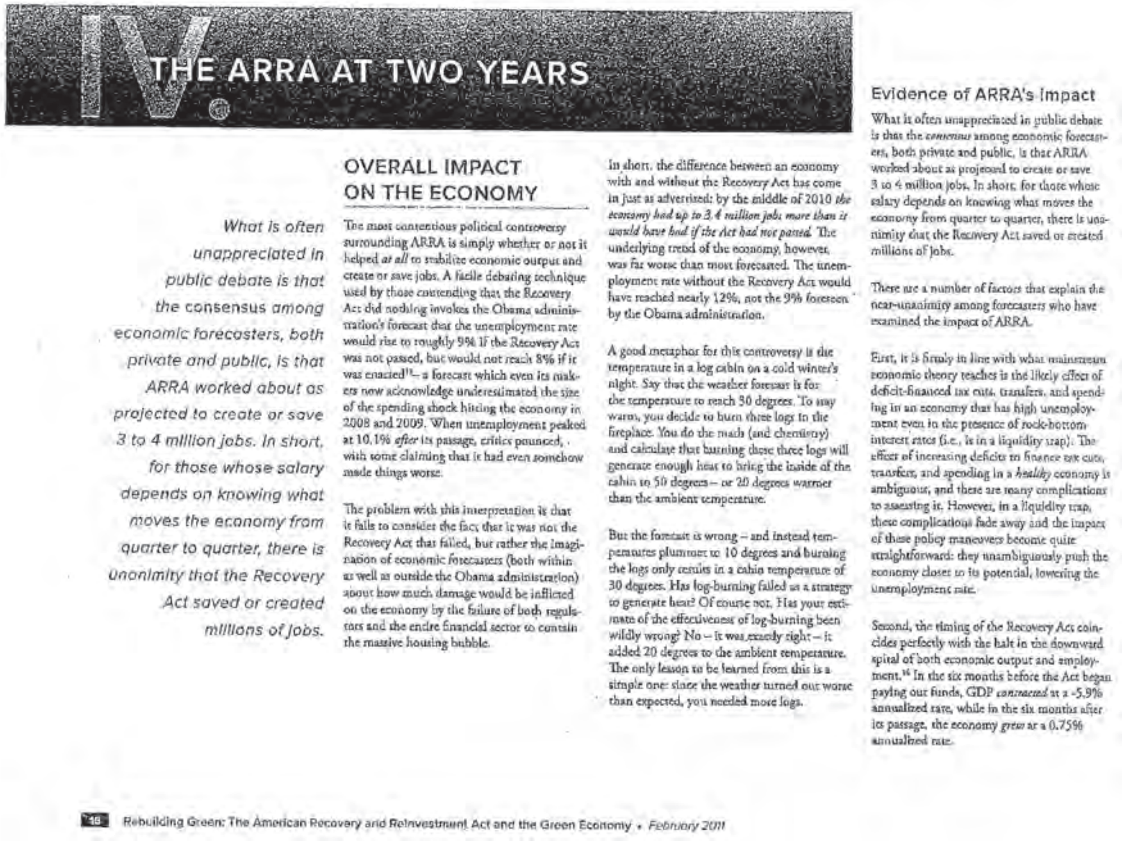
The Council of Economic Advisors (CEA), in its quarterly reports on the economic impacts of the ARRA, classifies the public investment spending of ARRA into 10 functional categories. A distinct green economy category is not one of the 10, but we can use the O*Net and BLS definitions and identification of industry sectors to construct a green economy public investment category for the purpose of this analysis that builds on the CEA categorizations. The category we have developed encompasses spending accounts, in whole or part, from the following CEA categories:

- **Clean Energy:** CEA includes both direct investment and tax incentives in this category. In CEA's second quarterly report they break it down into different subcategories: Energy Efficiency; Renewable Generation; Grid Modernization; Advanced Vehicles and Fuels Technologies; Traditional Transit and High Speed Rail; Carbon Capture and Sequestration; Green Innovation and Job Training; and Clean Energy Equipment manufacturing. We include all of these as Green Economy investments.
- **Construction of Transportation Infrastructure:** The major green economy-building investments in high speed rail and transit were classified by CEA in the clean energy category. But we also include as Green Economy investments the portion of highway, road, and bridge infrastructure improvements that directly contribute to promoting fewer cars on the road and alternative forms of transportation, such as projects to build HOV (high-occupancy vehicle) lanes or bike paths.
- **Construction of Buildings:** There were a number of ARRA investments in construction and operations and maintenance. We include the portion of this spending invested in green building to an industry recognized certification, for example LEED, or in energy-efficiency improvements.
- **Environmental Cleanup and Preservation:** There were a number of ARRA investments in the cleanup of hazardous waste and remediation of contaminated sites and homes, in projects leading to cleaner and safer drinking water and water efficiency, and in projects that restore landscapes and habitat and reduce the likelihood of fires and flooding. We include all of these activities as Green Economy investments.
- **Broadband:** The build-out of broadband infrastructure holds the potential to revolutionize energy management in the United States and allows a set of services, including telehealth, long-distance business communication, distance learning, and e-commerce, all of which reduce travel and associated fuel use. We therefore classify the Recovery Act's significant broadband investments in our Green Economy category.

It is important to note what we do *not* include as green economy investments for the purpose of estimating job impacts, simply because of lack of available data. First, there were allocations made to states, tribes, cities and other local government entities that were used for both green and non-green purposes. Federal agencies often don't have information detailed enough to discern which investments can be designated as green. Where we don't have that information, we don't include the investments.

Second, there were a number of bond programs supported by the Recovery Act, most significantly the new Build America Bonds (BABs), which made it more affordable for states and cities to pursue capital projects that build infrastructure by providing a federal subsidy equal to 35% of the taxable borrowing cost. BAB issuances totaled over $180 billion through the end of 2010.[14] But states make the issuance for BABs and other bonds, and there is no requirement for them to report on what they use it for, so we don't have sufficient information to include any of them as Green Economy investments. In the case of bond programs that had to be used for exclusively green purposes – Clean Renewable Energy Bonds and Qualified Energy Conservation Bonds – there is a long lag on available data because state and local governments have to claim the interest subsidy, or bond holders must claim the tax credit, when they file their tax returns with the IRS.

Third, a number of investments were made through the tax code, and the law prohibits the IRS from releasing any information about their use. In the case of the Advanced Manufacturing Tax Credit program ("48C") – the ARRA's largest, most important direct investment in clean energy manufacturing – we can assume that most of these tax credits were used, but we can't determine how many were not in cases where companies lacked any tax liability. So these significant job-creating investments cannot be included either (although a case study of the program is included below).



IV. THE ARRA AT TWO YEARS

What is often unappreciated in public debate is that the consensus among economic forecasters, both private and public, is that ARRA worked about as projected to create or save 3 to 4 million jobs. In short, for those whose salary depends on knowing what moves the economy from quarter to quarter, there is unanimity that the Recovery Act saved or created millions of jobs.

OVERALL IMPACT ON THE ECONOMY

The most contentious political controversy surrounding ARRA is simply whether or not it helped *at all* to stabilize economic output and create or save jobs. A facile debating technique used by those contending that the Recovery Act did nothing invokes the Obama administration's forecast that the unemployment rate would rise to roughly 9% if the Recovery Act was not passed, but would not reach 8% if it was enacted[15] – a forecast which even its makers now acknowledge underestimated the size of the spending shock hitting the economy in 2008 and 2009. When unemployment peaked at 10.1% *after* its passage, critics pounced, with some claiming that it had *even somehow* made things worse.

The problem with this interpretation is that it fails to consider the fact that it was not the Recovery Act that failed, but rather the imagination of economic forecasters (both within as well as outside the Obama administration) about how much damage would be inflicted on the economy by the failure of both regulators and the entire financial sector to contain the massive housing bubble.

In short, the difference between an economy with and without the Recovery Act has come in just as advertised: by the middle of 2010 *the economy had up to 3.4 million jobs more than it would have had if the Act had not passed.* The underlying trend of the economy, however, was far worse than most forecasted. The unemployment rate without the Recovery Act would have reached nearly 12%, not the 9% foreseen by the Obama administration.

A good metaphor for this controversy is the temperature in a log cabin on a cold winter's night. Say that the weather forecast is for the temperature to reach 30 degrees. To stay warm, you decide to burn three logs in the fireplace. You do the math (and chemistry) and calculate that burning these three logs will generate enough heat to bring the inside of the cabin to 50 degrees – or 20 degrees warmer than the ambient temperature.

But the forecast is wrong – and instead temperatures plummet to 10 degrees and burning the logs only results in a cabin temperature of 30 degrees. Has log-burning failed as a strategy to generate heat? Of course not. Has your estimate of the effectiveness of log-burning been wildly wrong? No – it was exactly right – it added 20 degrees to the ambient temperature. The only lesson to be learned from this is a simple one: since the weather turned out worse than expected, you needed more logs.

Evidence of ARRA's Impact

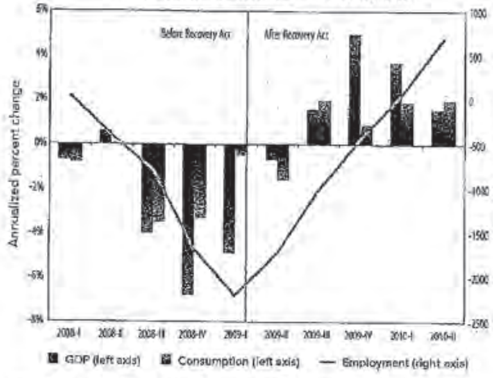
What is often unappreciated in public debate is that the *consensus* among economic forecasters, both private and public, is that ARRA worked about as projected to create or save 3 to 4 million jobs. In short, for those whose salary depends on knowing what moves the economy from quarter to quarter, there is unanimity that the Recovery Act saved or created millions of jobs.

There are a number of *factors* that explain the near-unanimity among forecasters who have examined the impact of ARRA.

First, it is firmly in line with what mainstream economic theory teaches is the likely effect of deficit-financed tax cuts, transfers, and spending in an economy that has high unemployment even in the presence of rock-bottom interest rates (i.e., is in a liquidity trap). The effect of increasing deficits to finance tax cuts, transfers, and spending in a *healthy* economy is ambiguous, and there are many complications to assessing it. However, in a liquidity trap, these complications fade away and the impact of these policy maneuvers become quite straightforward: they unambiguously push the economy closer to its potential, lowering the unemployment rate.

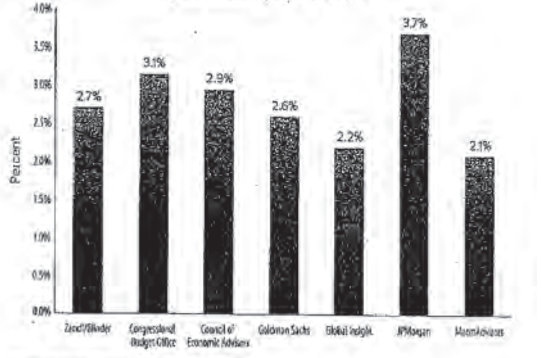
Second, the timing of the Recovery Act coincides perfectly with the halt in the downward spiral of both economic output and employment.[16] In the six months before the Act began paying out funds, GDP *contracted* at a -5.9% annualized rate, while in the six months after its passage, the economy *grew* at a 0.75% annualized rate.

FIGURE 6. Quarterly change in real GDP, consumption expenditures, and employment



Source: EPI analysis of Bureau of Labor Statistics data and Bureau of Economic Analysis data.

FIGURE 7. Contribution of Recovery Act to GDP by the second quarter of 2010



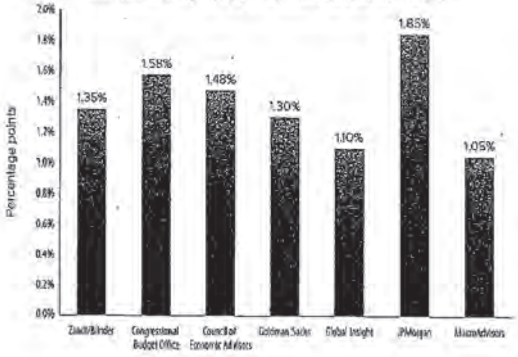
Source: Data from sources listed above.

In the six months before the Recovery Act took effect, average monthly employment declined by over 700,000, while in the six months after its passage, these declines fell nearly in half to 369,000. In the second six months of the year following its passage, average employment was roughly stable, and began growing consistently thereafter.[17] (See figure 6)

In the end, given the wealth of evidence arguing that the ARRA has boosted employment and output growth, we think it best to assess its effect by simply surveying the estimates of the forecasters (public and private) that have examined it. The full range of these estimates are presented below, which show that ARRA had boosted GDP by up to $520 billion and employment by up to 3.4 million jobs by the middle of 2010 and had lowered the unemployment rate by up to 1.8 percent relative to what would have happened without its passage. It should be noted that these figures show the averages of each study's assessment of the ARRA's impact – each study allows for the probability that the ARRA had much greater effect than this on the economy – and preliminary evidence shows that some parts of the ARRA (unemployment insurance, for example) actually provided more stimulus than even high-end estimates of its effect before the ARRA would have suggested.[18,19]

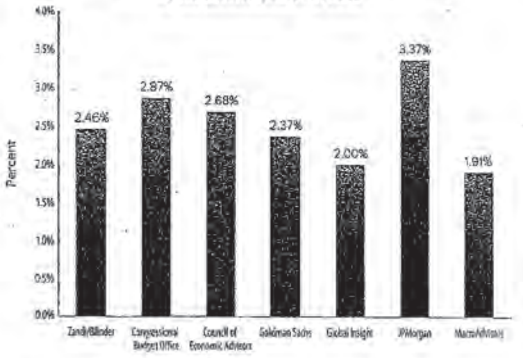
Figures 7-9 show the effect of the Recovery Act on GDP, jobs, and unemployment, respectively.

FIGURE 8. Percentage-point decrease in unemployment rate due to Recovery Act by the second quarter of 2010



Source: Data from sources listed above.

FIGURE 9. Contribution of Recovery Act to employment by the second quarter of 2010



Source: Data from sources listed above

IMPACT OF GREEN ECONOMY INVESTMENTS

Methodology

For a detailed explanation of our methodology, see Appendix B.

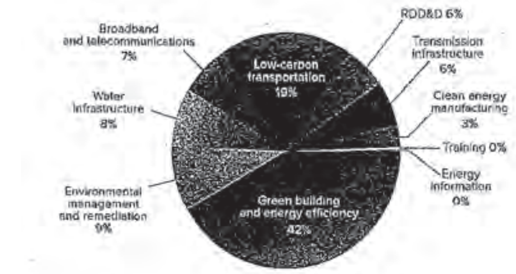
Running the Numbers

Inputs

This section estimates the labor market impact of the green investments contained in the Recovery Act. The specific programs, their associated spending, and the portion that can be specified as green can be found in Appendix A. A detailed explanation of how these programs were mapped to the BLS industries is available by the authors upon request.

For this report we used obligations to measure the portion of the green investments that have impacted the economy. The difference between obligations and outlays resides in government's specific role in the contractual process for these funds: obligations represent how much money has already been legally commited to specific projects, while outlays measure how much money has actually gone out the door. A popular analogy is that an obligation is like writing a check to another person, while an outlay is like that person actually cashing the check.

FIGURE 10. Composition of ARRA green investments to date
(obligations)



Source: ETI analysis of Recovery.gov ARRA Spending Account data and portions of the obligation and outlays used for Green Economy activities as determined by administering agencies

For most categories of spending, it is proper to measure the economic impact by using outlays. But infrastructure investment – which is how we can characterize the vast majority of the Recovery's green investment – is unique, in that infrastructure projects tend to use a reimbursement-based system, where the outlays occur only *after* work is completed. This means that obligations – not outlays – drive economic activity, as it is the obligation of funds that spurs companies to hire or retain workers and begin projects.

Findings

We find that the Recovery Act obligated $93 billion through the end December 2010 to green economic activities in a broad range of industry sectors (see Figure 10 and Table 1). Using standard macroeconomic multipliers applied to direct government spending and infrastructure investments we find that these green investments boost overall GDP by $146 billion and create or save approximately 997,000 total jobs. These jobs include both the green jobs within the primary industries that meet the additional demand for goods

TABLE 1. Job impact of ARRA green investment

	Green Jobs		
Broad Industry/Occupations	**Direct**	**Indirect**	**Total**
[illegible]			
Natural Resources and Mining	4,411	8,765	13,175
Construction	259,062	2,490	261,552
Manufacturing – Total	20,769	56,092	76,861
Wholesale Trade	0	17,255	17,255
Retail Trade	0	23,586	23,586
Information	11,347	11,965	23,312
Financial Activities	1,419	15,413	16,832
Professional and Business Services	19,081	41,698	60,778
Education Services	0	524	524
Leisure and Hospitality	0	17,101	17,101
Other Services	35,635	36,234	71,869
Utilities	3,724	1,339	5,062
Transportation and Warehousing	11,367	16,766	28,133
Government – Total	0	12,508	12,508
[illegible]			
Mgt, Bus and Fin	40,188	42,834	83,022
Professional	24,092	37,349	61,441
Service	4,568	26,254	30,822
Sales & Related	5,578	28,476	34,054
Office & Admin Support	28,434	43,062	71,496
Farm, Fish, Forest	425	3,591	4,017
Construction & Extraction	185,502	7,960	193,462
Install, Maintain & Repair	21,871	12,646	34,518
Production	18,293	33,253	51,546
Transport	37,862	31,477	69,339

The Council of Economic Advisors identifies ARRA's clean energy investments as leveraging the largest amount of co-investment, with $46 billion of federal funds supporting more than $150 billion of additional investment, most of it from the private sector.

and services (direct jobs) and in the secondary industries that supply those primary industries with intermediate goods and services (indirect jobs). This total also includes the jobs created by the effect of incomes being re-spent back into the economy (induced jobs).

We then turn to an input-output model to characterize the types of jobs likely created through the first-round of direct spending on these green investments. We find that the types of jobs created through these investments also disproportionately benefit those who have been on the losing end of structural trends in the labor market over the past few decades. While about 72% of the labor force does not have a four-year college degree, over 80% of the jobs are filled by such workers (see Table 2 on the following page). Yet despite lower education, most of these workers are actually paid better – fewer jobs fall into the lowest wage quintile and more fall into the middle of the wage distribution. About 20% of the jobs are filled by Hispanics, a group that which right now constitutes only 15% of the jobs in the overall economy.

These green investments, however, do not benefit the entire labor market proportionately: the jobs associated with these investments skew heavily in favor of men, with only 24% of the direct and indirect jobs going to women. (That said, it's worth noting that the full impact of the investments – which includes the jobs created by re-spending – would not be as skewed toward men). In addition, 9% of the direct and indirect jobs go to African Americans, lower than the 11% in the overall labor market. This skewing is primarily the result of many of these jobs being concentrated in the construction sector, where both groups are under-represented. It is important to note that our modeling cannot capture the very intentional ways in which many ARRA-funded projects involve strategies that create pathways for under-represented workers to access the jobs created by these projects. The training programs of the Laborers' International Union of North America (LIUNA) and the Utility Workers Union of America (UWUA) that are referenced in the case studies section below include such pathways, and the case study on Kansas City's Green Impact Zone demonstrates how multiple ARRA projects can be coordinated and leveraged to target communities that have too often been at the losing end of the U.S. labor market.

These examples provide the building blocks for a policy agenda that confronts head-on the challenge of gender and racial inequities in certain industry sectors (for example, "construction career" strategies that lift up job standards in the construction industry and develop new recruitment and training standards that help new workers get into the jobs). Such strategies are integral to building a green economy that provides opportunity for all Americans.

Co-investment

We should note that these job estimates include only the impact of money allocated *directly* through the Act. Yet many of the provisions of the Act were actually designed to spur substantial co-investment from the private sector, by providing tax incentives or matching funds to firms undertaking green investments. The Council of Economic Advisors identifies ARRA's clean energy investments as leveraging the largest amount of co-investment, with $46 billion of federal funds supporting more than $150 billion of additional investment, most of it from the private sector.[28]

For the purposes of this report, if, for example, ARRA appropriated $5 billion to be given to firms undertaking an equivalent amount of their own investment in clean energy, then only the $5 billion allocated through the Act is counted in the above jobs analysis. But the $5 billion put up by the private-sector firm may well have never happened without the spur provided by ARRA and probably represents a net boost to the economy as well. Because we do not have a good way to assess just how much of the private-sector co-investment would or would not have happened in the absence of ARRA, we do not quantify its impact in this report – although it should be noted that in an economy performing significantly below potential, more of these private co-investments would not have otherwise occurred. Thus, our job estimates are quite conservative and likely underestimate the total job impact of the Recovery Act's green investments.

Economic models vs. recipient reporting

It's important to note that using multipliers based on macroeconometric models and input-output models is necessary to capture the full impact of spending on green investments. The jobs numbers reported on Recovery.gov are often cited, and their relatively low levels have fed critics of ARRA who claim they prove that the spending is not translating into job-creation efficiently.

But, the recipients' reports that form the basis of the Recovery.gov reporting system, while hugely valuable for oversight reasons, are inappropriate for calculating the full job impacts spurred by the Recovery Act's public investments or the composition of those jobs. Most importantly, they omit re-spending, or induced jobs. That is, while a construction company that receives ARRA funds reports the direct jobs supported by the project, construction workers who have money because of the ARRA grant may then go buy lunch at the local diner, supporting employment of cooks and waitresses. These jobs, supported through "re-spending" effects of the initial round of spending that hired the construction company, are not going to be captured in the recipients' reports. And these re-spending effects are large – up to 40% of total jobs created.

Further, recipients' reports will miss supplier jobs as well. Again, while the construction company reports its own employees supported by an ARRA grant, it does not calculate the number of steel company employees needed to make the girders used in the construction project. For capital-intensive industries that are direct recipients, these supplier jobs can be a large part of the total. Knowing the composition of these supplier jobs are key to characterizing the types of jobs supported by the investments decisions of the ARRA. Finally, some of ARRA's public investments were made through the tax code, and the users of these tax credits are not required to report even the direct jobs supported by their receipt of these funds.

TABLE 2. Job impact of ARRA green investment

Job Characteristics	Green Jobs			Induced Jobs	Total Job Impact	Direct	Indirect	Green Jobs Total	Overall Economy
	Direct	Indirect	Total						
Totals	366,814	268,483	635,297	362,119	997,416	58%	42%	100%	
GENDER									
Male	311,956	167,915	479,871	*	*	85%	63%	76%	60%
Female	54,858	100,568	155,426	*	*	15%	37%	24%	40%
RACE									
White	237,744	183,624	421,368	*	*	65%	68%	66%	67%
Black	29,090	29,363	58,453	*	*	8%	11%	9%	11%
Hispanic	85,988	39,918	125,906	*	*	23%	15%	20%	15%
Asian	7,565	11,054	18,619	*	*	2%	4%	3%	4%
Other	6,428	4,523	10,951	*	*	2%	2%	2%	2%
UNION STATUS									
Covered	67,622	24,269	81,890	*	*	16%	9%	13%	12%
Non-covered	309,192	244,214	553,406	*	*	84%	91%	87%	88%
EDUCATION									
Less than High School	76,013	31,342	107,355	*	*	21%	12%	17%	11%
High School Only	146,542	87,376	233,919	*	*	40%	33%	37%	31%
Some College	91,031	77,485	168,516	*	*	25%	29%	27%	30%
BA or greater	53,227	72,280	125,507	*	*	15%	27%	20%	28%
WAGE QUINTILE									
First (lowest)	46,586	51,677	98,263	*	*	13%	19%	15%	19%
Second	80,422	53,848	134,269	*	*	22%	20%	21%	21%
Third	88,037	54,948	142,985	*	*	24%	20%	23%	20%
Fourth	84,285	54,503	138,788	*	*	23%	20%	22%	20%
Fifth (highest)	67,485	53,507	120,991	*	*	18%	20%	19%	20%

* Induced job characteristics are not included because the input/output model only predicts direct and indirect job characteristics. However, they would likely mirror the overall economy.

V CASE STUDIES

An analysis of the data can only provide a limited understanding of the impacts of the Recovery Act's green investments. These investments have been translated into economic activity in remarkably diverse ways, varying by program, industry sector and region of the country. This section attempts to capture some of this diversity and the successes and challenges of the Recovery Act's implementation, and in the process illustrate how the green economy and green jobs are not some abstract niche of the overall economy, but rather central to it and scalable with the right policies.

Department of Energy (DOE) – Weatherization Assistance Program

The vast potential of building efficiency – to reduce energy costs and greenhouse gas (GHG) emissions while creating jobs – has been articulated by many, not least of whom being Secretary of Energy Steven Chu, who refers to it as "the fruit lying on the ground." America's 300 billion square feet of building stock account for roughly 40% of U.S. energy consumption and GHG emissions, a larger share than either transportation or industry.[21] As with the U.S. energy system generally, however, buildings are strikingly inefficient energy consumers, and the application of cost-effective efficiency measures to them can cut these costs dramatically.

In response to this opportunity, the Recovery Act invested heavily in building efficiency. The single largest investment of $5 billion went to DOE's Weatherization Assistance Program (WAP), a program that has helped more than 6.2 million low-income families make energy-efficiency improvements to their homes since its inception more than three decades ago.

But the implementation of the Recovery Act's $5 billion for WAP was slowed by a combination of factors. The program had received roughly $225 million annually in the years leading up to the passage of ARRA, and the more than a 10-fold increase in allocation strained capacity of states and providers to ramp up quickly while maintaining program quality. Issues at the state level – in particular state hiring freezes and furloughs – delayed the ability of certain states to prepare plans and implement other provisions. The ARRA also included new requirements that took time to understand and implement, most notably Davis-Bacon prevailing wage requirements, which were applied to the program for the first time in order to address the inconsistent and often low quality of jobs within the weatherization industry. Prevailing wages for weatherization workers had not previously been determined by the Department of Labor (DOL); it was not until October 2009 that DOL determined such wages and issued the necessary guidance.[22]

The intersection of these factors led to serious, unexpected delays. The state of Nevada was representative in this regard: Nevada received a $37.3 million WAP allocation under ARRA.[23] But by the end of 2009, according DOE's Inspector General, only 84 units in total had been weatherized in the state of Nevada.[24]

Though slow to start, WAP implementation in Nevada did eventually gain great momentum, nowhere more so than in the southern part of the state, where HELP of Southern Nevada, a community action agency, has administered WAP for the past 18 years. HELP and its contractors retrofitted 2,695 units over a six-month period, from mid-December 2009 through the end of May 2010, more than doubling the agency's ARRA goal (1,222 units over a 12-month period) in just half the expected time. These installed measures will save each home an average of $430 annually on energy costs.[25] In Nevada as a whole 5,542 units were weatherized with ARRA WAP funds through November 2010. Nationwide, 300,000 units were weatherized with ARRA funds through the end of 2010, putting WAP on target to meets its goal of 600,000 units.[26]

HELP's ability to achieve its outcomes depended on a dramatically expanded capacity: HELP hired 19 new staff – energy auditors, inspectors, trainers, and accountants – and doubled from four to eight their contractor base, which collectively employed 120 workers on the weatherization projects. And it depended on an extremely skilled and productive workforce. For example, all of HELP's assessors/inspectors have been trained in all aspects of weatherization and all have Building Performance Institute or other industry-recognized certifications, while all other staff are required to have skill certifications in their respective occupations.[27]

The emphasis on skills extended to the contractor and crews that did the installation. One of HELP's contractors, Better Building Systems (BBS) of Las Vegas, was able to ramp up so quickly because of project managers with long experience renovating hotels and casinos on the Las Vegas strip and a because of a workforce represented by LIUNA Local 872, which used its own training infrastructure to train its workers in weatherization skills, including new members for whom the training and jobs served as a pathway out of poverty. (Local 872's efforts to recruit workers who are typically under-represented in the building trades is illustrated by the demographics of the 166 individuals who went through their weatherization training program in 2009-2010: 66% were people of color including 30% who were African American; and 15% who were women.[28]) In addition, Local 872's hiring hall approach allowed BBS to recruit new crews of highly trained, ready-to-go workers whenever it needed, without having to take time to find and interview candidates for the job.

HELP and its contractors, having spent all of their regular WAP ARRA funds, are now about to start implementing a $4.6 million SERC (Sustainable Energy Resources for Consumers) grant, additional ARRA funds awarded to high-performing local weatherization providers across the country, which HELP will use to install solar water heaters and other energy-saving measures on homes. But once this money is spent, the future of the home retrofit industry's growth in southern Nevada, as across the country, is unclear.

ARRA appropriation:

Obligated as of December 31, 2010:

Outlaid as of December 31, 2010:

Jobs created/saved, Oct-Dec, 2010:

Homes weatherized as of
December 31, 2010:

Photo courtesy of Southern Nevada LECET

DOE – Industrial Technologies Program

A critical factor in the global competitiveness of American industry is the degree to which those industries are energy efficient. Industrial sectors in the U.S. economy use more than 30% of U.S. energy, and are responsible for nearly 30% of U.S. GHG emissions. At the same time, by one estimate, the use of available energy-efficiency technologies could reduce industrial energy consumption up to 21% by 2020, saving U.S. industry $47 billion per year.[30]

It is symptomatic of the United States' ongoing lack of a coherent industrial policy that the primary program for promoting energy-efficiency improvements for American manufacturing, DOE's Industrial Technologies Program (ITP), had an annual base budget in 2009 of only $90 million. The ITP's mission is to help research, develop, and deploy – in partnership with industry – innovative technologies that companies can use to improve their energy productivity, reduce carbon emissions, and increase their competitiveness.[31]

In 2009, the ITP received $150 million of ARRA funds, and in November of that year awarded nine grants for energy-related projects across the country. The largest of the grants awarded was $31.6 million to ArcelorMittal Indiana Harbor in East Chicago.[32] Indiana Harbor is the largest steelmaking facility in North America, employing nearly 6,000 workers, covering thousands of acres, and operating multiple blast furnaces that transform raw materials into almost 10 million tons of high-quality, finished steel annually.[33]

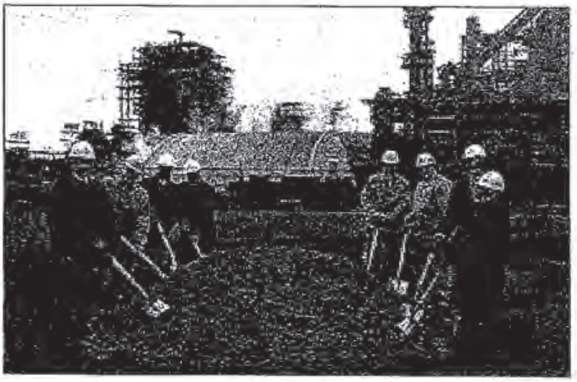


Photo courtesy of ArcelorMittal

For a number of years the facility has used the waste gas from its blast furnaces, combusting it in blast furnace stoves and steam boilers to create energy. Most of the steam produced is for generating electricity, while the remainder is used to drive rotating equipment and for heating purposes throughout the plant.

However, prior to the project, approximately 80% of the blast furnace gas was used for operations and approximately 20% was wasted by "flaring" it into the atmosphere, emitting pollutants in the process. This was due to the plant not having the facilities to capture and use the gas efficiently. Seeing this opportunity to use the flared waste gas, ArcelorMittal began evaluating potential projects more than a decade ago. Most recently, a cost-benefit analysis was done in 2008 to review and re-estimate the project to determine what it would take to convert the flared gas to electricity.

But the project was not able to move forward at the time due to its high cost and insufficient return on investment when compared to competing projects. The ITP grant solicitation completely changed the cost-benefit calculation. By providing a 50% matching grant, the project became attractive and cost competitive for ArcelorMittal. With the total $63.2 million investment, the facility will add an additional boiler to co-generate both steam and electricity, generating enough to power the equivalent of nearly 30,000 American homes for a year, and allowing the company to decrease GHG emissions by approximately 333,000 tons annually – the equivalent of taking over 60,000 cars off the road.

Just as important are the economic impacts. Although the project only broke ground in October 2010, it will create, according to estimates, 360 jobs related to the design, construction, and manufacture of the equipment alone (for example, the new boiler that has been ordered is manufactured by Indeck at its plant in Erie, Penn.). It will also employ 200 local construction workers, and, through the energy cost savings it yields, support the thousands of workers who rely on the plant for jobs.[34] The project will help increase the sustainability of ArcelorMittal Indiana Harbor for the future and its ability to provide steel and jobs in a fiercely competitive global marketplace.

ARRA appropriation: [illegible]

Obligated for Industrial Efficiency grants as of December 31, 2010:

Invoiced for Industrial Efficiency grants as of December 31, 2010:

Jobs created/saved, Oct.-Dec. 2010:

DOE – Western Area Power Administration Borrowing Authority

The United State is home to enormous resources of clean energy. But it lacks a modern transmission grid infrastructure that can deliver that clean energy – often sourced most productively from sparsely populated areas such as the Great Plains and desert Southwest – to areas of high population density and energy use, in particular at the west and east coasts.

The Recovery Act attempted to address this problem by providing significant new borrowing authority to the Western Area and Bonneville Power Administrations (WAPA and BPA), two of the four power administrations within the Department of Energy that are tasked with marketing and transmitting electricity from federal power generators to consumers across multiple states. The purpose of the borrowing authority that WAPA received from the Recovery Act was to expand and upgrade their electric power transmission systems to enable the transmission of new renewable electricity resources.

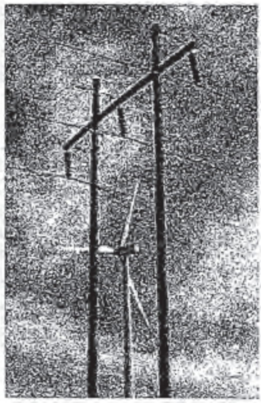
WAPA issued a solicitation for loans in March of 2009 and received applications from over 200 transmission line projects. Despite such strong demand, WAPA determined that only two of the projects were ready to move forward to construction in the near term. As of this writing, only one has broken ground, and WAPA has spent only a small portion of the borrowing authority given it by ARRA.

Such a low ratio of applications to approved projects – and thus WAPA's disappointing progress in making investments in transmission infrastructure – is only understandable in the context of how many barriers need to be surmounted in order to get transmission line projects to the starting line in the United States. These are primarily policy barriers that make up a crazy quilt pattern of different planning, siting, and cost allocation regimes. Unless these barriers are addressed, it is unlikely that the United States can scale up its transmission capacity to meet the demand for electricity from renewable sources.

The sole project that proved to be "shovel ready," and one that illustrates the promise of these investments, is the Montana-Alberta Tie Line – a green power transmission line connecting the electricity markets of Montana and Alberta, Canada (electrons don't stop at borders, and neither do electricity markets). The project developer, Tonbridge Power, spent five years getting the necessary permits, negotiating the necessary land deals for siting the line (over 400 separate deals with individual landowners, not including additional consultation with neighbors and other landowners within a one-mile radius of the right of way), and lining up investors. But with the onset of the global economic crisis in 2008, the commitment letters from banks disappeared overnight, and Tonbridge was stranded with $70 million of sunk costs and no investors. WAPA's loan offered the project a lifeline when it was most needed. The loan, for up to $161 million, was issued in the fall of 2009, and ground was broken on the project before the end of the year. The ground breaking would almost certainly not have happened when it did without the Recovery Act, given the meltdown in the commercial market.[16]

The project's green power source is wind, which Montana has in abundance (the state is ranked third among states in wind energy potential). The transmission line will carry electricity generated by a 309 MW wind farm in Montana called Rim Rock, which will capture wind coming off the Rocky Mountains. The wind farm developer, NaturEner, will sell the American-made energy – call it a clean energy export – to consumers in Alberta. The 206 turbines for the wind farm will be manufactured by Acciona Wind Power, which plans to supply most of the turbines from their West Branch, Iowa plant.[17] Two other wind farm developers, GreenHunter and Invenergy, have also reserved space on the line and will sell power to U.S. markets, including the Portland, Oregon area.

About a quarter of the Tie Line is now completed; Tonbridge expects it to be finished by the end of 2011. Rocky Mountain Contractors, based in Helena, employed 120 construction workers – including linemen, electricians, welders, and mechanics – in December 2010 to build the line and substations, as well as 57 engineering designers, surveyors, geotechnical personnel, and management staff.[18] Project developers estimate that the wind farms will also create an additional 50 to 75 jobs, ranging from operators to turbine maintenance technicians.



ARRA borrowing authority

Obligated as of December 31, 2010

Invoiced as of December 31, 2010

Jobs created/saved, Oct-Dec 2010

DOE – Grants for Electric Vehicle and Component Manufacturing and Transportation Electrification

Americans drive cars – a lot. Increasingly, the rest of the world does, too. The intersecting trends of dwindling oil supplies, rising gas prices, increasing global demand for cars, and climate change makes investments in low-carbon automotive technologies simultaneously imperative and an enormous economic opportunity.

The Recovery Act doubled down on electric-drive vehicle technologies. Its targeted portfolio of investments in electric vehicles is creating a domestic battery and transportation electrification industry that is positioning itself to command significant global market share. When the Recovery Act passed, the United States produced less than 2% of the world's hybrid batteries. By 2012, the United States will have the capacity to produce 20% of the world's lithium-ion batteries for advanced vehicles. By 2015, this share will rise to 40%.[40] In that same year, 30 factories located in 19 states will have the combined capacity to supply 500,000 electric-drive vehicles annually.

The resources provided by ARRA for electric vehicle technologies resulted in more than 70 awards worth more than $2.5 billion. These awards were targeted at each level along the innovation chain: from research and development, to component and battery manufacturing, to deployment of vehicles and charging stations. The awards went to:

- Nine battery-manufacturing projects;
- Eleven facilities to manufacture battery components;
- Ten projects to manufacture electric-drive components;
- Eight demonstration projects that will deploy 13,000 vehicles and 20,000 chargers in more than 20 cities around the country;
- Ten education programs to train the workforce required for the new electric-vehicle industry; and
- More than 20 transformative R & D projects with the potential to develop next generation technologies for batteries and electric-drive components.[41]

When the Recovery Act passed, the United States produced less than 2% of the world's hybrid batteries. By 2012, the United States will have the capacity to produce 20% of the world's lithium-ion batteries for advanced vehicles.

The investments are helping to overcome the major barrier to scaling up the electric vehicle industry: the cost and performance of batteries. When the Recovery Act passed, batteries were too heavy and too bulky and wore out too easily. The grants are investing across several lithium-ion chemistries to make batteries more affordable, lighter, longer-lasting, and higher-performance.

Although it is not an ARRA-funded program, the Advanced Technology Vehicle Manufacturing Program should be noted because its low-interest loans for the domestic production of advanced-technology vehicles and their key components are so complimentary: more than $8.6 billion in loans have been made to advanced vehicle manufacturers. The projects announced to date include $1.4 billion to Nissan to establish battery production and assembly of the Leaf in Tennessee, support for major expansions for start-ups Tesla and Fisker, and loans that helped Ford establish 13 projects supporting 30,000 jobs.

The bottom line: the Recovery Act is helping build a competitive auto industry at a critical moment in its evolution, while accelerating the pace of improvement in vehicle technology. And it is creating and supporting jobs: to date all nine battery factories have started construction. Twenty-six of 30 battery, suppliers, and component factories have broken ground, as well. Two companies – A123 and Johnson Controls – started high-volume production in September 2010.

ARRA appropriation for Electric Vehicle and Component Manufacturing:

Obligated as of December 31, 2010:

Invoiced as of December 31, 2010:

Jobs created/saved, Oct-Dec 2010:

ARRA appropriation for Transportation Electrification:

Obligated as of December 31, 2010:

Invoiced as of December 31, 2010:

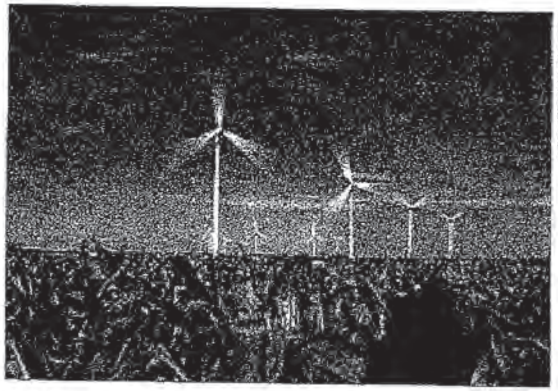
Jobs created/saved, Oct-Dec 2010:

Department of Treasury – Section 1603 Grant-in-Lieu-of Tax Credit Program

The wind energy sector has been the fastest growing of U.S. renewable energy industries in recent years. From 2005 to 2009, the domestic wind industry saw record-breaking growth – a quadrupling of wind turbine installations over that period, culminating in 10,000 megawatts installed in 2009. Given the onset of the Great Recession, 2009 was not expected to be a record breaker; in fact, wind installations were projected to drop by 50%.[43] However, due to an essential provision in ARRA, the wind industry was able to continue installing new capacity at a recession-defying pace. Section 1603 of ARRA extended the Production Tax Credit (the PTC, a policy instrument crucial to the wind industry's growth) through 2012, and allowed developers to convert the PTC into a 30% Investment Tax Credit that could be converted into an equivalent cash grant through the end of 2010 (extended by Congress in December of that year through the end of 2011). By monetizing the primary financial incentive for the industry at a time when a tax credit was of little value to most investors due to a frozen equity market for tax credits, ARRA provided a huge boost to the industry and paved the way for a record-breaking year.

These renewable energy tax credits, as with almost all tax credits, are only available after an investment is made. In the case of wind, before a tax credit is accessible, developers must first move a project through a multi-year development process, raise millions in private capital, construct the project and bring it online to deliver power to the grid. The certainty of the tax credit's availability creates a strong incentive to make these multi-million dollar investments in the U.S. The economic crisis in late 2008 created extreme uncertainty, eroding the ability to raise capital, causing projects to stop in their tracks, and creating serious risk of layoffs and derailing of investment.

One of the projects saved by 1603 was a new wind farm developed in Illinois by Iberdrola Renewables, called Streator Cayuga Ridge, where construction had begun in October 2008. The financial crisis imperiled the future of the project and the company's overall investment plans in the United States. Iberdrola Renewables' global parent company, Iberdrola SA, contemplated reducing its U.S. wind power investment by approximately 50%. Turbines that were to be allocated to U.S. wind power projects were being considered for reallocation to the company's affiliates in other countries with more long-term market stability. Section 1603 enabled Iberdrola Renewables to resume not just the construction of the Streator Cayuga Ridge project, but the entirety of its U.S. investment plans.[44]



Construction of the wind farm was completed in March 2010. Over the course of the project, the workforce on site averaged 180 construction workers – Mortenson Construction, based in Minnesota, was the primary contractor – with a peak of more than 400 workers. (To give a sense of scale, the foundation of just one wind turbine requires 51 truckloads of concrete.) Twenty to 30 jobs, primarily in wind turbine operations and maintenance, are supported on site currently. The 150 wind turbines that were installed came from Gamesa North America, based in Pennsylvania, which made the turbine blades at their Ebensburg plant and assembled the hubs and nacelles at their Fairless Hills plant.

continued >

Additional blades were made by LM Wind Power USA in North Dakota. The towers were manufactured by Tower Tech Systems in Wisconsin. The other turbine components were made by a range of manufacturers, and many were most likely imported. The U.S. wind energy industry has made considerable progress in increasing the domestic content of its turbines, particularly for bigger parts like blades and towers. (For example, Gamesa's domestic content on U.S.-made turbines is over 60%, one of the highest standards in the industry.) But a challenge remains to source nacelle internals – smaller yet highly complex, high-value components – domestically, which in turn requires assisting U.S. manufacturers to transition their production and connect to the supply chains of the wind industry's OEM's (Original Equipment Manufacturers) and first-tier suppliers.

It is estimated that the Streator Cayuga Ridge wind farm will contribute between $2.7 and $3.5 million annually to the local tax base in rural Illinois and pay approximately $1.2 million annually in total to local landowners (who will also continue to use their land for farming). The 300 MW generated by the wind farm is being sold to the Tennessee Valley Authority under a 20-year power purchase agreement.[45]

Section 1603 was vital to other renewable energy sectors, as well. For example, the program supported the deployment of over 4,000 solar energy systems, helping the U.S. solar industry continue its strong growth, which saw the installation of 429 MW in 2009, 38% above the 2008 total.[46] The program continued to be integral to the wind industry in 2010 as tax equity markets remained tight: 81% of wind capacity installed in the first three quarters of 2010 used the 1603 tax credit option.[47] And yet the upward growth trajectory of the wind industry has stalled, with only 5,115 MW of wind power brought online in 2010, barely half of 2009's record pace. The main problem: continued uncertainty of federal policies – in particular the lack of a national Renewable Electricity Standard or a price on carbon – which in turn deprives U.S. wind developers and manufacturers of the long-term and stable market signal that many other countries have put in place to support companies as they take risks on big capital investments.

TABLE 3. 1603 grants awarded through the end of 2010[48]

Industry	Grants	Total $
Biomass (open loop, cellulosic)	12	$105,933,765.00
Biomass (open loop, livestock)	17	$9,504,950.00
Combined Heat & Power	6	$4,733,064.00
Fuel Cell	8	$4,411,775,00
Geothermal	3	$2,230,290.00
Geothermal Electricity	6	$260,674,171.00
Geothermal Heat Pump	19	$4,212,522.00
Hydropower (incremental)	6	$6,764,908.00
Landfill Gas	12	$20,229,384.00
Marine	1	$215,990,00
Microturbine	3	$82,500.00
Small Wind	115	$48,995,885.00
Solar Electricity	4,279	$468,937,927.00
Solar Lighting	1	$6,625,00
Solar Thermal	123	$3,451,037.00
Trash Facility	2	$2,748,064.00
Wind	137	$4,888,323,166.00
Total	**4,750**	**$5,831,456,023.00**

Tax credit recipients are not required to report the job impacts of the credit. If and hopefully when the program is extended again, it should include new provisions that require the Secretary of Energy to establish goals for the creation and retention of domestic jobs through the program and require recipients to report the number of jobs created and retained. As more federal investments for infrastructure migrate from traditional appropriations to the tax code and other innovative financing approaches, it is essential that federal prevailing-wage protections are included. The consistent application of these prevailing-wage laws assures that federal investments do not undermine local community standards of living.

Department of Treasury/DOE – Advanced Manufacturing Tax Credit Program (48C)

The transition to a green economy holds the potential to revitalize American manufacturing. Instead of importing or extracting the sources of our energy, green technology sources of energy can be made in the United States in high-value, labor-intensive ways. Indeed, we are starting to see this happen. For example, the wind energy industry employs 18,500 workers in the manufacturing sector, with 14,000 more in the pipeline, as turbine manufacturers develop domestic supply chains to reduce transportation costs, decrease currency risk, and increase just-in-time turbine availability, product quality, and service.[38]

Yet competition for green manufacturing is fierce, particularly from countries where government policy provides support to its own manufacturers and bolsters long-term market certainty (or additionally, in the case of China, manipulates its currency to keep the price of its manufactured goods artificially low).

U.S.-based manufacturers need federal policy to level the global playing field. The Recovery Act included a new Advanced Energy Manufacturing Tax Credit (also known as "48C" for its place in the tax code) to do just that. ARRA authorized the Department of Treasury to award $2.3 billion in tax credits for qualified investments, providing a 30% credit for investments in new, expanded, or re-equipped advanced energy manufacturing projects. In January 2010, 183 projects in 43 states were awarded a tax credit. The demand was so great that qualified applicants exceeded available tax credits by a factor of three to one. Recipients of 48C included manufacturers from wind, solar, battery, biomass, smart grid, automotive, and geothermal sectors. And yet despite such demand, the program was not included in the tax extenders package passed by Congress at the end of 2010.

One of the tax credits – for $141.8 million – went to the Hemlock Semiconductor Group, a joint venture in which Dow Corning is the principal owner. It supported a $1 billion expansion of its polycrystalline silicon (polysilicon) production facility in Hemlock, Michigan. Polysilicon is a cornerstone raw material of the solar industry, used to produce solar cells that harvest renewable energy from sunlight. It is one of the solar manufacturing sectors where U.S.-based companies command a significant global market share. In 2009 an estimated 40% of global supply was produced in the United States.[39] A large portion of that came from the Hemlock Semiconducter site in Michigan, which even before the ARRA-supported expansion was the largest polysilicon production facility in the world.

This is the third major expansion at the Michigan facility in the last five years. The latest expansion will add up to 13,000 metric tons of capacity to the site, which is close to having the footprint of a small city. The construction, which Hemlock Semiconductor expects to be complete this year, has supported the employment of approximately 800 construction workers. The new expansion will add an additional 300 to 500 permanent new jobs, ranging from mechanical engineers to pipefitters to chemical operators.

continued >

In January 2010, 183 projects in 43 states were awarded a tax credit. The demand was so great that qualified applicants exceeded available tax credits by a factor of three to one.

The U.S.-based Dow Corning has a large amount of polysilicon production in the United States, but faces pressure to place that capacity near key markets for the solar industry.[51]

But the vast majority of the polysilicon produced at Hemlock Semiconductor won't be used in the United States. In 2009 the United States exported 12 times more polysilicon than it imported ($1.1 billion to $83.9 million).[52] Consistent with this trade flow, Hemlock Semiconductor will export most of the polysilicon it produces – to countries like Japan, China, and Germany. Why? Because the markets are there, not in the United States.

TABLE 4. 48C awards:[53]

Tech Area	Number of Projects	Total Tax Credit Requested
Battery	6	$ 32,810,400
Biomass	2	$ 29,304,480
Buildings	23	$ 178,839,742
CCS	2	$ 4,842,438
Fuel Cell	2	$ 5,510,100
Geo/Buildings	2	$ 9,054,126
Hydro	2	$4,053,733
Industrial	10	$ 169,118,509
Nuclear	2	$ 73,800,000
Smart Grid	9	$ 35,652,663
Solar	58	$ 1,125,546,921
Vehicles	4	$ 196,790,145
Wind	42	$ 291,302,368
Not specified	19	$ 135,712,113
Total	**183**	**$ 2,292,337,738**

The companies awarded 48C tax credits estimated they would create, in sum, 17,000 jobs. However, as with the Section 1603 program, there is no reported data available for the number of jobs supported by the program. If the program is extended again, as it should be, then new provisions should be added that require the Secretary of Energy to establish goals for the creation and retention of domestic jobs through the program and require recipients to report the number of jobs created and retained. In addition, the program's job creation potential should be maximized by adding a selection criterion giving the highest priority to projects that manufacture – rather than simply assemble – advanced energy components. And, finally, the tax credit should be refundable so that pre-revenue firms that don't yet have tax liability can use it immediately.

Environmental Protection Agency – Clean Water State Revolving Fund

Communities, environments, and economies rely on clean, safe water. Unfortunately, present day water usage and water infrastructure consumes vast amounts of energy and contributes to climate change in ways that threaten the availability of clean, safe water resources in the future. The way we produce energy involves the consumption of vast amounts of water, making energy production the second highest user of water in the country.[54] In addition, the collection, distribution, and treatment of drinking water and wastewater in the United States releases approximately 116 billion pounds of carbon dioxide annually, the equivalent of 10 million cars worth.[55] Water efficiency can help reduce drought likelihood, lower consumers' utility bills, and combat global warming pollution.

The ARRA appropriated $6 billion to the EPA's Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF), which are federal/state partnerships established to create a permanent source of financing for America's wastewater and water infrastructure needs, thereby reducing energy use, ensuring the resilience of water systems, and helping to meet public health goals. Water infrastructure improvements such as fixing pipes and water treatment processes also increase energy efficiency and conserve water resources; drinking water systems lose as much as 20% of treated drinking water due to leaks in their pipe networks every year.[56]

Through these state revolving fund (SRF) programs, funds are allocated to the states, which then lend it to borrowers to finance their infrastructure needs. The repayments of these loans, along with additional grant dollars from the EPA, allow these state SRF funds to grow and address further infrastructure needs. Over the life of these programs, over $100 billion has been provided to borrowers to fund infrastructure projects.

The implementation of the ARRA funds was not without its speed bumps. States were required to dedicate 20% of their allocations to a "green reserve" for projects that were particularly innovative in addressing water or energy efficiency and other environmental goals. EPA's Inspector General (IG) later concluded that the agency did not give clear and comprehensive guidance to states to determine the eligibility of such projects.[57] Another IG analysis found delays in contracting for projects at the local level, due to state and local budget cuts, and difficulty understanding and implementing new ARRA requirements.[58] However, all state SRF programs ultimately met, or exceeded, the 20% green reserve requirement and met the February 17, 2010, deadline to have all ARRA funds under contract.

Despite these challenges, the funds got out to states and projects around the county. One of those went to the town of Batesville, Arkansas, which received a $10 million loan from the state's ARRA CWSRF. The loan was for the replacement of the town's wastewater force mains, which were over 40 years old, the larger of the two often submerged by the nearby White River, where pipes can leak raw discharge into the river if damaged. It had not been possible for Batesville to attract a loan of this size and terms (over $6.3 million of the principal is forgiven) from a commercial lender, a not uncommon problem in rural parts of the state, or anywhere in rural America with low per-capita income.

The loan funds a project to replace the aging wastewater mains with a new 3,100 foot gravity sewer – 1700 feet of which is tunneled and the first of its kind in Arkansas – which will connect to the city's wastewater treatment plant. Tunneling for the sewer began in April 2010, and will likely be completed in the summer of 2011, six months ahead of schedule. The project has supported 40 construction jobs, most of them associated with boring the tunnel thorough which the gravity sewer runs. When completed, this new wastewater system will realize over 60% energy savings annually, or about 700,000 KW per year. And the White River, the town's life line, will no longer face the threat of pollution from raw sewage.

ARRA CWSRF appropriation:

Obligated as of December 31, 2010:

Outlaid as of December 31, 2010:

Jobs created/saved, Oct.-Dec. 2010:

Projects started / completed as December 31, 2010:

General Services Administration – High Performance Green Building Program

The United States is home to over five million commercial buildings and 120 million residential units that consume a substantial amount of energy and resources, as noted above. McKinsey and Company estimates that increased building efficiency would save the U.S. economy $130 billion per year, while reducing emissions by 1.1 gigatons a year.[60] Green buildings are a low-cost, high-return investment strategy to reduce energy consumption and emissions while creating jobs and lowering utility bills.[61]

The Recovery Act provided the General Services Administration (GSA) with $5.5 billion in funds, which included $4.5 billion to convert existing facilities into high-performance green buildings, as well as $1.0 billion for new high-performance green federal buildings, U.S. courthouses, and land ports of entry. GSA, the federal government's support agency that serves as the landlord of its buildings, was an early adopter of green buildings, based on a belief that the federal government can save taxpayer dollars and create significant demand in the marketplace by constructing and maintaining its building stock to rigorous green building standards, such as LEED.

Recovery Act funds are helping to modernize the Hipolito Garcia U.S. Courthouse in San Antonio, Texas. Built in 1937, the Courthouse is currently undergoing renovations to its heating ventilation, air conditioning, plumbing, roof, and exterior and interior finishes. Plans for modernizing the building had been in the works prior to the Recovery Act, but ARRA funding helped to make the project more ambitious and meet a more stringent green building designation, LEED Gold. One of the project's most innovative elements will be the addition of a vegetated green roof, which also serves as a light court for the building's upper five stories. The green roof will capture rainfall for use, and will itself be watered by condensate harvested from the outdoor exterior of the building. The building's 70 year-old fixtures are being replaced with the low-flow water fixtures. Storm windows are being added to the interior, preserving the building's historical status, while effectively blockading the super-highway of air that until now has allowed heat to enter and leave the building almost at will. And an advanced "smart" meter system is being added, which will allow GSA to monitor and adjust the building's energy and water use from its Fort Worth office.

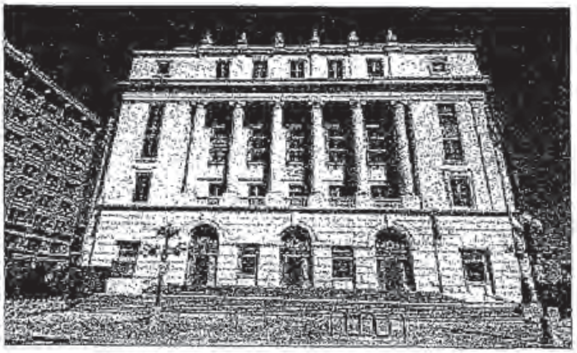


Photo courtesy of U.S. General Services Administration

In all, the project will help reduce indoor water consumption by 50%, outdoor water consumption by 100%, and energy use by 20%. The primary contractor, Beck Group, and its subcontractors, are currently employing 115 construction workers on the site; approximately 200 were employed at the project's peak. The renovation of Hipolito Garcia Courthouse is on schedule for completion in June 2012.

But the jobs created by the building's modernization don't end at the courthouse walls. The Recovery Act's Buy America provision – which requires that iron, steel, and manufactured goods used for ARRA-funded public buildings or public works projects be produced in the United States – has ensured supply chains of American jobs. For example, the solar PV array installed on the upper roof is using panels manufactured by the Hillsboro, Oregon-based SolarWorld. In addition, project developers estimate that $600,000 worth of materials and goods were made within a 500 square mile radius of San Antonio, which allows them to claim more points for the LEED Gold standard.[62]

Moving beyond the Recovery Act, President Obama's ground breaking Executive Order 13514 – Federal Leadership in Environmental, Energy, and Economic Performance – requires all federal agencies to achieve greenhouse gas reduction and energy efficiency improvement goals, and includes a requirement that all new federal buildings be designed to achieve zero-net-energy by 2030. We should be seeing many more Hipolito Garcia's in the future.

ARRA appropriation:

Obligated as of December 31, 2010:

Outlaid as of December 31, 2010:

Jobs created/saved, Oct–Dec 2010:

Department of Labor – Green Job Training

When the Green Jobs Act was passed in the 2007 Energy Bill, it was premised on two intersecting notions: renewable energy and energy-efficiency industries need skilled workers in order to realize the full economic potential of the transition to a green economy; at the same time, workers need pathways into quality training programs that lead to career-track jobs.

The drafters of the Recovery Act subscribed to the same notions – recognizing that job creating investments require corresponding investments in the skills of workers – and appropriated $500 million to the U.S. Department of Labor (DOL) to train workers for energy industries defined in the Green Jobs Act. In June 2009, DOL issued five grant solicitations to competitively award the funds.

DOL received close to 1,000 applications that met the requirements of the grants, and ultimately issued awards to the winners in late 2009 and early 2010. One of those awards, for close to $5 million, went to the Utility Workers Union of America (UWUA), which runs a program to train workers for the utility industry. UWUA initiated the project recognizing that the current, aging utility workforce is approaching a demographic cliff – new workers will be needed for as many as 30-40% of the nation's current electric power workforce by 2013 – and that changing technologies in the sector will require new skills.[44] UWUA's goal is to train 359 entry-level workers and 360 incumbent workers with the grant in local labor markets in three different states, Massachusetts, New Jersey, and California, where they and their employers have identified demand for workers with particular skills.

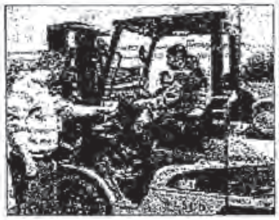
The California program, in partnership with Southern California Gas Company, Southern California Edison, CA Water Service Company, and Golden West Water, targets 300 incumbent workers, many of them meter readers and meter techs, who will require updated skills. The utilities are transitioning to smart meter and other new energy technologies, and the question of how this impacts the existing workforce – and whether they will benefit from the new jobs that come with this transition – has become very contentious. As this debate plays out, UWUA is providing career ladder training for the jobs they know will be there at the utilities, including customer service and residential energy technician positions. They are also training, based on labor market analysis, 100 new entry level workers for in-demand jobs at water utilities. The training they receive will prepare them to earn the Water Treatment and Water Distribution certifications required by the state to fill these positions.

The New Jersey program, in partnership with PSEG and Elizabeth Town Gas, also targets both incumbent and entry-level workers. As in California, workers (in this case incumbent workers) are being trained to attain Water Quality and Compliance certifications, as well as Waste Water and Water Distribution certifications. Entry-level workers are receiving the skills necessary for LEED and BPI (Building Performance Institute) energy auditor certifications necessary to perform the utilities' retrofitting of residential and commercial buildings.

The Massachusetts program, in partnership with NStar, targets mostly entry-level workers and a handful of incumbents. These workers undertake a rigorous two-year program that prepares them to be relay techs (responsible for setting up the underground wiring necessary for a smart grid to function) and overhead linemen.

In each region, UWUA also partners and in some case subcontracts with local community colleges, workforce investment boards, community-based organizations, and government agencies, which provide recruitment, training, support, and job placement services and typically bring their own leveraged resources to the table. Classes are delivered in traditional classrooms but sometimes via distance learning and – in California – a mobile lab provided by Los Angeles Trade Technical College, so working adult students can better access them. These are for-credit classes, so workers can link them as part of a career pathway.

The results: through the end of 2010 the UWUA programs in the three sites have collectively enrolled 281 workers (of whom 51% are Hispanic, 31% are African American and 33% are women), with 179 workers currently in training. The more than one hundred who have completed training received an industry-recognized credential and in some case an Associate's degree. Fifty-six of the entry-level workers have been placed in new jobs at starting hourly wages that range from $17.82 to $29.56.[45] The stories of some of these students and workers can be found at a blog developed by UWUA: http://accordnow.org/index.php/programs1/program-2/gs-gj-blog/



ARRA appropriation:

Obligated as of September 30, 2010:

Outlaid as of September 30, 2010:

Participants entered education and training as of September 30, 2010:

Participants completed education and training as of September 30, 2010:

Participants entered new jobs after program completion as of September 30, 2010:

Department of Housing and Urban Development – Lead Hazard Reduction Program

The Recovery Act aims to "invest in a strong foundation for a 21st century economy." That strong foundation includes healthy people ready to accept the challenges of building a new green economy. ARRA dollars spent on creating and preserving jobs that improve the environmental health of American families are green economy investments with an extra dividend for our common future.

Today, according to the Centers for Disease Control and Prevention, chronic disease is the leading cause of death and disability among Americans. New studies report that, over the last 40 years, the incidence of infertility, breast and testicular cancer, heart disease, and diabetes have increased in adults, and asthma, autism, certain birth defects, cancer, and learning disabilities are affecting more children. Exposure to toxic chemicals is one of the factors in this increased disease burden for U.S. families. New studies have also added to our understanding of how even the smallest exposure to chemicals like lead and PCBs (Polychlorinated Biphenyls) can impact human health, especially the normal development of a pregnancy or young child.

ARRA made significant investments in programs administered by a number of federal agencies that share promotion of environmental health as a common denominator, paying for projects like the clean-up of PCBs and metals at the Cornell Dubilier Electronics site in South Plainfield, New Jersey, the lead and arsenic project in the Jacobsville Neighborhood of Evansville, Indiana, and the PCB remediation effort at the Outboard Marine Corp site in Waukegan, Illinois.

While some ARRA funded projects, like those described above, have focused on cleaning up toxic chemicals at Superfund toxic dumpsites, other projects are focused on eliminating toxic chemicals in our homes. The Healthy Homes and Lead Hazard Control project in Malden, Massachusetts is one such project, administered by the Department of Housing and Urban Development (HUD). Lead is a highly toxic substance that can cause health problems at any level of exposure. Lead can harm a child's brain, kidneys, bone marrow, and other body systems. At high levels, lead can cause coma, convulsions, and death. Low levels of exposure, like those a pregnant woman or child would get from inhaling the dust in an older home that still has lead-based paint, are associated with impaired cognitive function, behavior difficulties, fetal organ development, reduced intelligence, impaired hearing, and reduced stature.

With Recovery Act funding, the Healthy Homes and Lead Hazard Control Project has allowed the Malden Redevelopment Authority (MRA) to retain five public-service employees who would have been laid off, add 2 new full-time Rehabilitation Specialist positions, and provided additional job opportunities in lead-based paint hazard-control projects for 35 contractor, labor, and trades positions. The project's increased volume of construction work has given local contractors the ability to add an additional six full-time positions, including several for Malden public housing tenants.

The $3 million grant has, to date, paid for the rehabilitation work to make some 200 homes healthy and safe for the people who live in them. In partnership with Healthy Malden, Inc., Tri-City Community Action Program, and the Malden Board of Health, the project is also providing lead-abatement training scholarships for 40 local people, expanding their blood lead testing program and educating 10,000 people about how to protect and enhance the health of their homes.

The $3 million grant has, to date, paid for the rehabilitation work to make some 200 homes healthy and safe for the people who live in them.

ARRA appropriation:

Obligated as of December 31, 2010:

Outlaid as of December 31, 2010:

Jobs created/saved, Oct–Dec. 2010:

Number of units completed through December 31, 2010:

Department of Transportation – Supplemental Discretionary Grants for a National Surface Transportation System

Many of the funding initiatives of ARRA were designed to reduce fuel use and increase transportation options for Americans. One such initiative, the Transportation Investment Generating Economic Recovery (TIGER) grants program, administered by the U.S. Department of Transportation, awarded grants competitively to projects around the country of regional or national significance. They were selected based on a variety of criteria, including the likelihood that they would increase economic competitiveness, livability, safety, and sustainability while reducing energy usage and dependence on foreign oil, and preventing pollution and greenhouse gas emissions.

One of the recipients was the Green Impact Zone in Kansas City, Missouri, where TIGER funding is being synergized with multiple ARRA investments to support an innovative partnership that is creating jobs and restoring communities. The Green Impact Zone, now in its second year, is a comprehensive initiative to rebuild and revitalize a distressed 150-square-block area of Kansas City's urban core, leveraging and coordinating the resources of ten neighborhood organizations and 16 other local partners. Through targeted job training, green infrastructure investment and community outreach, the initiative combines its TIGER grant with ARRA funds from the Weatherization Assistance Program, Energy Efficiency and Conservation Block Grant (EECBG), Smart Grid, and workforce development programs, to create jobs – over 100 to date, many of them zone residents – train workers for them, and put the community on track for environmental and economic sustainability.

Rebuilding and expanding local infrastructure is one of the Green Impact Zone's central pillars. In February 2010, the Kansas City Metro was awarded a $50 million TIGER grant. Of this funding, $26.2 million is being used for transportation infrastructure improvements in the zone, including improvements to pedestrian access, transit facilities, traffic signals, street rehabilitation and the addition of a pedestrian bridge. The remaining $23.8 million is being used for improvements to regional transit corridors, building on the launch, in 2010, of a new bus rapid transit service. The route serves the city's highest ridership corridor, which transects the Green Impact Zone, and features hybrid electric buses, rain gardens, and a park-and-ride facility built with a special concrete that helps protect local water quality. Green Impact Zone staff are contributing to a new streetscape plan for one of the area's main boulevards, readying the way for new construction jobs this year and creating a more accessible, walkable neighborhood.

The pedestrian and transit elements are especially crucial in meeting the livability and sustainability components of the TIGER program, giving better access to employment for the zone's residents and reducing household transportation costs, while also helping to reduce their carbon footprint.

Energy and water efficiency projects are also creating jobs within the zone. The projects are made possible by an investment of $20 million in ARRA Energy Efficiency and Conservation Block Grant funds. Funding from this grant is supporting EnergyWorks KC, a local partnership providing zone and other Kansas City residents with energy audits and retrofits. Funding from the grant is also providing staff capacity to support, coordinate, and encourage a wide variety of other weatherization and efficiency projects. For example, Kansas City Power & Light has already installed 3,000 advanced smart meters and 700 MySmart Displays through a Smart Grid grant to help customers save energy and money through increased efficiency. Another efficiency project is the Green Impact Zone's Community Crews initiative, which is putting teams of young people to work on stormwater diversion projects after their training in concrete finishing by the Ivanhoe Community Council. Eighty-six projects have already been completed.[18]

ARRA appropriation:

Obligated as of December 31, 2010:

Outlaid as of December 31, 2010:

Jobs created/saved, Oct–Dec, 2010:

The Green Impact Zone is living up to its name and creating tangible results in terms of employment and strengthening the fabric of community. These projects are making Kansas City a more sustainable city, saving money and ensuring that community residents who most need work are doing the work that most needs to be done.

VI. CONCLUSION: THE CASE FOR FURTHER INVESTMENT IN THE GREEN ECONOMY

In short, the greatest near-term challenge facing the U.S. economy is finding enough work for un- or underemployed Americans, while the greatest long-term challenge facing the United States and global economies is constructing a smooth transition to much less carbon-intensive forms of economic activity. Investments in the green economy help ameliorate both challenges. Not undertaking them would squander an enormous opportunity.

Every serious effort to evaluate the impact of ARRA has indicated that it worked as advertised: the U.S. economy would have 3 to 4 million fewer jobs today and would be hundreds of billions of dollars poorer had it not been passed. In this report, we find that $93 billion of green investments were injected into the economy by the Recovery Act through the end of 2010, creating or saving nearly a million jobs.

Yet, as of December 2010 the U.S. economy still needs 11 million jobs to return unemployment to its pre-recession level. Clearly more fiscal support is needed.[70]

Given this need, an effective policy path forward would be to pursue strategies that spur growth and employment in the near-term. As Figure 2 showed, infrastructure investments are clearly excellent near-term fiscal support in terms of the additional output and employment generated through each dollar of spending.

Further green investments would also clearly be timely enough to help ameliorate the current jobs crisis – remember, even relatively optimistic forecasts do not predict unemployment rates returning to pre-recession levels again until 2015.[71] Unlike some other forms of economic stimulus, if by some chance there is an unexpected economic recovery that leads to very low rates of unemployment very soon, additional green investments would not, *even if they are debt-financed,* "crowd-out" other investments and lead to a smaller economy-wide capital stock. Thus, the case for these investments is still strong even if the economy didn't need new jobs.

The value of investments in green infrastructure has been recognized by many – including President Obama. In the State of the Union speech the president called for a historic commitment to meeting the clean energy challenge – and promised federal dollars to back this commitment up:

"...And in a few weeks, I will be sending a budget to Congress that helps us meet that goal. We'll invest in biomedical research, information technology, and especially clean energy technology, an investment that will strengthen our security, protect our planet, and create countless new jobs for our people...Instead of subsidizing yesterday's energy, let's invest in tomorrow's."

This commitment of federal dollars, combined with other policy changes to complement them – like mandating targets for the generation of electricity from renewable sources, and greater energy efficiency, or ensuring that the full cost of carbon emissions is actually reflected in market prices – is exactly what the U.S. economy needs to fight joblessness in the short-run and the threat of catastrophic climate change in the long-run. And in between it will provide a foundation for economic growth based on a labor market that provides jobs and raises wages for the broad swath of American workers.

In short, the greatest near-term challenge facing the U.S. economy is finding enough work for un- or underemployed Americans, while the greatest long-term challenge facing the United States *and* global economies is constructing a smooth transition to much less carbon-intensive forms of economic activity. Investments in the green economy help ameliorate both challenges. Not undertaking them would squander an enormous opportunity.

APPENDIX A: ARRA GREEN ECONOMY SPENDING BY TREASURY ACCOUNT

Agency - ARRA Spending Account (Recovery.gov)	Appropriations	Obligations (as of 12/31/10)*	Green Economy Obligations (as of 12/31/10)**	Outlays (as of 12/31/10)	Green Economy Outlays (as of 12/31/2010)***
CORPS - Construction	2,000,000,000	2,135,452,189	530,700,000	1,027,425,964	226,900,000
CORPS - Formerly Utilized Sites Remedial Action Program	100,000,000	99,303,991	99,303,991	52,682,259	52,682,259
CORPS - Mississippi River and Tributaries	375,000,000	364,817,121	38,300,000	267,130,585	8,400,000
CORPS - Operation and Maintenance	2,075,000,000	2,035,462,839	157,700,000	1,555,487,482	118,300,000
DOC - Broadband Technology Opportunities Program	4,200,000,000	4,260,343,353	4,260,343,353	208,018,499	208,018,499
DOD - Military Construction, Defense-wide, Recovery Act	1,450,000,000	1,122,464,606	1,128,394,000	92,575,648	92,575,648
DOD Air Force - Family Housing Construction, Air Force, Recovery Act	80,100,000	77,211,674	77,211,674	54,615,110	54,615,110
DOD Air Force - Military Construction, Air Force, Recovery Act	180,000,000	163,382,616	163,382,616	74,011,125	74,011,125
DOD Air Force - Military Construction, Air National Guard, Recovery Act	50,000,000	48,676,449	48,676,449	46,304,502	46,304,502
DOD Air Force - Operation and Maintenance, Air Force, Recovery Act	1,034,959,000	1,007,648,154	473,409,000	872,750,605	360,194,000
DOD Air Force - Operation and Maintenance, Air Force Reserve, Recovery Act	11,187,000	10,866,189	364,000	8,030,240	364,000
DOD Air Force - Operation and Maintenance, Air National GuardRecovery Act	23,348,000	23,245,502	47,000	20,067,736	47,000
DOD Army - Military Construction, Army, Recovery Act	180,000,000	161,123,874	161,123,874	72,549,261	72,549,261
DOD Army - Military Construction, Army National Guard, Recovery Act	50,000,000	46,992,916	46,992,916	32,676,642	32,676,642
DOD Army - Operation and Maintenance, Army, Recovery Act	1,361,025,000	1,360,649,350	531,414,000	924,331,764	343,007,000
DOD Army - Operation and Maintenance, Army National Guard, Recovery Act	265,304,000	265,292,426	224,468,000	194,149,778	153,365,000
DOD Army - Operation and Maintenance, Army Reserve, Recovery Act	94,769,000	94,733,549	16,027,000	56,490,305	7,149,000
DOD Marines - Military Construction, Navy, Recovery Act	280,000,000	234,890,441	234,890,441	102,220,544	102,220,544
DOD Marines - Operation and Maintenance, Marine Corps, Recovery Act	106,865,000	103,823,702	96,847,000	86,129,923	79,431,000
DOD Marines - Operation and Maintenance, Marine Corps Reserve, Recovery Act	38,905,000	38,094,739	1,106,000	17,823,491	61,000
DOD Marines - Operation and Maintenance, Navy, Recovery Act	623,051,000	608,012,828	397,940,000	267,844,340	133,258,000
DOD Marines - Operation and Maintenance, Navy Reserve, Recovery Act	47,083,000	44,928,615	3,937,000	32,319,555	2,199,000
DOD Army - Research, Development, Test, and Evaluation, Army, Recovery Act	75,000,000	74,982,864	74,982,864	24,185,692	24,185,692
DOD Air Force - Research, Development, Test, and Evaluation, Air Force, Recovery	75,000,000	74,976,592	74,976,592	53,455,697	53,455,697
DOD Marines - Research, Development, Test, and Evaluation, Navy, Recovery Act	75,000,000	74,532,720	74,927,000	61,353,819	63,379,000
DOD - Research, Development, Test, and Evaluation, Defense-wide, Recovery	75,000,000	72,983,572	72,993,572	40,795,064	40,795,064

Agency - ARRA Spending Account (Recovery.gov)	Appropriations	Obligations (as of 12/31/10)*	Green Economy Obligations (as of 12/31/10)**	Outlays (as of 12/31/10)	Green Economy Outlays (as of 12/31/2010)***
DOE - Energy Efficiency and Renewable Energy	16,803,000,000	16,665,322,140	16,665,322,140	5,100,490,095	5,100,490,095
DOE - Energy Transformation Acceleration Fund	400,000,000	386,773,416	386,773,416	54,803,377	54,803,377
DOE - Fossil Energy Research and Development	3,400,000,000	3,379,417,816	3,379,417,816	133,532,713	133,532,713
DOE - Electricity Delivery and Energy Reliability	4,500,000,000	4,475,615,475	4,475,615,475	736,378,958	736,378,958
DOE - Environmental Management	11,370,000,000	5,961,726,508	5,961,726,508	3,314,769,979	3,314,769,979
DOE - Title 17 Innovative Technology Loan Guarantee Program	5760000000	401,055,666	401,055,666	76,559,494	76,559,494
DOE - Uranium Enrichment Decontamination and Decommissioning Fund	390,000,000	388,796,813	388,796,813	228,915,197	228,915,197
DOE - Western Area Power Administration, Borrowing Authority, Recovery		140,000,000	140,000,000	97,190,599	97,190,599
DOE - Bonneville Power Administration Fund		381,023,084	381,023,084	381,023,084	391,023,084
DOE - Advanced Technology Vehicles Manufacturing Loan Program	10,000,000	9,089,711	9,089,711	8,232,772	8,232,772
DOI - Construction	180,000,000	140,094,944	29,908,766*	97,508,167	17,555,077†
DOI - Construction	180,000,000	136,174,687	29,071,833*	72,223,011	17,555,077†
DOI - Construction and Major Maintenance	589,000,000	549,181,457	117,244,342*	245,555,418	44,209,058†
DOI - Management of Lands and Resources	125,000,000	93,780,071	20,021,038*	52,830,567	9,511,458†
DOI - Operation of Indian Programs Recovery Act (3 Year)	40,000,000	361,194,935	77,111,239*	234,879,638	42,287,023†
DOI - Operation of the National Park System	146,000,000	141,885,047	30,290,934*	108,773,220	19,583,203†
DOI - Resource Management	165,000,000	158,990,909	33,942,851*	118,503,037	21,334,930†
DOI - Surveys, Investigations, and Research	140,000,000	143,275,077	30,587,690*	75,185,796	13,536,224†
DOI - Water and Related Resources	950,000,000	879,885,040	187,846,219*	356,629,046	64,208,419†
DOI - Wildland Fire Management	15,000,000	14,572,911	3,111,160*	11,564,681	2,082,070†
DOL - Training and Employment Services	3,910,500,000	3,920,004,794	159,809,536	2,577,699,151	57,350,618
DOT - Capital Assistance for High Speed Rail Corridors and Intercity Passenger Rail Service	8,000,000,000	4,278,661,338	4,278,661,338	50,019,688	50,019,688
DOT - Capital Grants to the National Railroad Passenger Corporation	1,300,000,000	1,302,193,744	1,302,193,744	1,180,951,578	1,180,951,578
DOT - Capital Investment Grants	750,000,000	745,497,815	745,497,815	742,599,968	742,599,968
DOT - Fixed Guideway Infrastructure Investment	750,000,000	746,110,481	746,110,481	400,595,266	400,595,266
DOT - Highway Infrastructure Investment	27,500,000,000	26,854,576,906	1,213,542,145	17,413,023,252	749,503,661
DOT - Supplemental Discretionary Grants for a National Surface Transpo	1,500,000,000	1,304,046,828	1,304,046,828	24,718,443	24,718,443
DOT - Transit Capital Assistance	6,900,000,000	7,314,187,602	7,314,187,602	3,782,107,565	3,782,107,565
EPA - Hazardous Substance Superfund	600,000,000	633,873,969	633,873,969	443,041,135	443,041,135
EPA - Leaking Underground Storage Tank Trust Fund	200,000,000	190,402,079	190,402,079	100,723,991	100,723,991

Agency - ARRA Spending Account (Recovery.gov)	Appropriations	Obligations (as of 12/31/10)*	Green Economy Obligations (as of 12/31/10)**	Outlays (as of 12/31/10)	Green Economy Outlays (as of 12/31/2010)***
EPA - State and Tribal Assistance Grants	6,339,000,000	6,247,434,160	6,247,434,160	4,413,378,107	4,413,378,107
GSA - Energy-Efficient Federal Motor Vehicle Fleet Procurement, Recove	300,000,000	299,989,103	299,989,103	299,954,475	299,954,475
GSA - Federal Buildings Fund	5,545,000,000	5,221,117,481	5,221,117,481	1,298,034,527	1,298,034,527
HUD - Assisted Housing Stability and Energy and Green Retrofit Investments	125,000,000	178,973,083	40,589	61,904,421	61,904,421
HUD - Green Retrofit Program (Loans) for Multifam Housing - Recov Act	125,000,000	68,526,789	68,526,789	68,526,789	68,526,789
HUD - Lead Hazard Reduction	100,000,000	98,909,099	98,909,099	43,767,642	43,767,642
HUD - Public Housing Capital Fund	4,000,000,000	3,978,019,743	596,929,920	2,562,549,973	90,921,532
TREAS - Grants for Specified Energy Property in Lieu of Tax Credits, Rec		5,821,377,096	5,821,377,096	5,821,377,096	5,821,377,096
TREAS - Tax Incentives for Energy Efficiency and Renewable Energy		9,258,000,000	9,258,000,000	9,258,000,000	9,258,000,000
USDA - Capital Improvement and Maintenance	650,000,000	621,839,512	621,839,512	382,632,595	382,632,595
USDA - Distance Learning, Telemedicine, and Broadband Program	2,500,000,000	2,423,535,858	2,423,535,858	27,053,172	27,053,172
USDA - Rural Water and Waste Disposal Program Account	1,380,000,000	1,328,206,116	1,328,206,116	130,145,005	130,145,005
USDA - Watershed and Flood Prevention Operations	290,000,000	288,760,906	288,760,906	165,834,338	168,834,338
USDA - Wildland Fire Management	500,000,000	498,311,528	498,311,528	225,297,966	225,297,966
VA - Medical Facilities	1,000,000,000	997,827,676	486,000,000	463,369,018	167,000,000
Total	134,354,100,000	134,032,643,282	93,064,651,229	69,701,279,697	42,732,340,523

* Some Obligations are larger than Appropriations due to transfers between accounts

** The portion of the obligation used for Green Economy activities as determined by administering agency

*** The portion of the outlay used for Green Economy activities as determined by administering agency

† The Department of Interior provided a single estimate of green obligations and outlays. We calculated programmatic estimates by assuming each program had a proportional share

APPENDIX B: METHODOLOGY

The first question that arises in this sort of modeling exercise is how to characterize the policy input for the model to analyze, that is, we need to know how federal, state, and local policies will change spending levels overall and across industries. In the current case, these inputs are the investments in green projects and technologies that represented an economically and politically significant portion of the Recovery Act. These data on the obligations and outlays of the Recovery Act through December 2010 are from Recovery.gov, while the green shares (where necessary to calculate because only a portion of a spending account was used for green economy activities) were provided by the specific agencies.

These investment flows are then inputted into our jobs model. The first step requires judgments both on how much spending is being called for and into which industries the spending flows. Generally, this judgment has been based on research reports, interviews with experts, and other sources to get a sense of how the overall spending package will be allocated to the different industrial sectors identified in our model.

Jobs model

Once inputs have been specified, we use experience gained in previous research that merges industrial data on input-output relationships with household-level data on demographic and labor market variables to characterize the job outcomes that would result from the change in industrial mix accompanying increased green investment.

The jobs model allows us to identify both the (relative) number and type of direct and indirect jobs created for a given amount of spending in a particular industry. This includes the workers directly hired in the construction industry as well as the workers newly hired by industries that supply construction (heavy equipment, for example). The model also provides us a total job impact number that includes induced jobs, which stem from incomes being re-spent back into the economy, as in the new wait staff hired at a diner near a construction site to handle increased demand from the site's workers.

It is also important to note that these estimates are based on currently existing patterns of employment across sectors. As such, the final results tell us how many and what kinds of jobs would be created with our current economy. However, to the extent that the new investments are aimed at transforming the economy or labor market, our results are not precisely indicative of the true impact. For example, policy restrictions on the kinds or quality of jobs created and specific policy targeting of job creation would lead to different outcomes than estimated here. The numbers presented here compose an estimated baseline for policy makers to consider.

How many jobs?

Calculating the total number of jobs supported by a given stream of green investment takes four steps. First, we use the Employment Requirements Matrix Input/Output table from the Bureau of Labor Statistics (BLS) to translate a given amount of spending into the number of jobs directly supported in the receiving industries. Second, using the same table, we then calculate how many jobs are needed to produce the output in supplier industries that expand to support the output generated by the industries directly receiving the investment flows. The construction industry (for example) is a purchaser of cement, steel, heavy equipment, as well as less obvious supplies – such as accounting and legal services. These supplier industries will need to expand to support final output of the construction industry when it expands.

Third, we use a multiplier for infrastructure investment of 1.57 estimated by Mark Zandi to calculate the induced jobs from the re-spending effects.[72] While not all of this spending can be characterized as infrastructure investment, other more generic multipliers for general government spending have very similar magnitudes.[73] This multiplier is applied to the amount of spending to get the total amount of generated economic activity. We then use the conventional economic rule of thumb that each 1% increase in GDP corresponds to 1 million new jobs.

Finally, we apply this total job impact number back to the results of the input/output table. By dividing the total by 1.57, we get the total amount of direct and indirect jobs (i.e., no induced jobs), and by applying the results from the input/output table, we calculate the demographic data and are able to break it down by direct and indirect jobs.

What kinds of jobs?

To estimate the characteristics of jobs created through the green investment portion of the Recovery Act, we use data from the Current Population *Survey* (CPS) to calculate the share of each industry's employment by relevant categories (gender, race, ethnicity, wage levels, etc.). To ensure we have a large enough sample size, we pool together data from 2005 to 2007.

To match up the CPS data on demographic and labor market variables with the BLS data on industry input-output relationships, we construct a crosswalk between the industry coding schemes used in the respective datasets. The crosswalk matches up both the CPS and the BLS industry codes to the North American Industrial Classification System, or NAICS that maps clearly onto both the CPS and BLS data. (This crosswalk is available from the author upon request.)

Next, we multiply the number of jobs created in each industry (either through direct spending or through supplier effects) by the industry demographic shares, and then sum these up across industries to get the total number of jobs in each category (both direct and supplier jobs) that are created through a given amount of green spending.

Limitations to the model

The model directs the green investments into an assortment of different industries included in the 202 industry series from BLS. As expected, one of the main industries that these investments flow into is construction. Unfortunately this industry series includes a single undifferentiated construction category (limitations in the CPS industry series prevents us from using more detailed BLS industries). This construction category does not capture the differences between commercial vs. residential construction or heavy vs. light construction. We have made alterations to the model to account for the different employment impacts of highway, transit, and maintenance and repair of the transportation infrastructure[24], but generally speaking the model's overreliance on a broad construction category remains a problem that we are continually trying to solve.

Endnotes

1 See Bivens, J. and Heidi Shierholz, 2010. "For job seekers, no recovery in sight—Why prospects for job growth and unemployment remain dim", Briefing Paper, Economic Policy Institute. http://www.epi.org/publications/entry/bp259/

2 In theory, technological change that makes the cost of extraction much cheaper can enable the supply of oil to rise more quickly than demand over time. And for large parts of past centuries it seems clear that technological change actually won the race against growing demand. Going forward, however, there is a growing consensus that demand will outpace supply – the IEA, the EIA and OPEC all forecast growth in oil supply that looks to lag growth in demand over the coming decade – and this follows a decade (the 2000s) that saw a strong upward trend in oil prices.

3 U.S. Energy Information Administration, "Short-Term Energy Outlook – Real Energy Prices," February 8, 2011. http://www.eia.doe.gov/EMEU/steo/realprices/index.cfm

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6 U.S. Global Change Research Program, 2009. "Global Climate Change Impacts in the United States," New York, NY: Cambridge University Press.

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8 The PEW Charitable Trusts. 2010. "Who's Winning the Clean Energy Race?"

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10 See Bivens, Irons and Pollack (2010) on the benefits of infrastructure investment for workers without a 4-year college degree.

11 It should be noted that not everybody dismissed infrastructure spending as effective stimulus in early 2008 – see Eisenbrey, Irons, and Mishel (2008), "Strategy for economic rebound: Smart stimulus to counteract the economic slowdown," Briefing Paper, Economic Policy Institute. http://www.epi.org/publications/entry/bp210/

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13 Bureau of Labor Statistics. "Measuring Green Jobs." http://www.bls.gov/green/

14 Boyd, John D. 2011. "Stimulus Bonds Generated $181 Billion," The Journal of Commerce. Feb 1.

15 Romer, Christina and Jared Bernstein 2009. "The Job Impact of the American Recovery and Reinvestment Plan," January 8. http://otrans.3cdn.net/45593e8ecbd339d074_l3m6bt1te.pdf

16 In this context, the Recovery Act is dated as beginning April 1, 2009. While it was passed in late February and some money was spent before this, April 2009 is the first month during which significant amounts of money were spent.

17 While there were months with job-losses in the second half of the year following ARRA's passage, these were mostly attributable to layoffs occurring due to the end of the decennial census – private sector employment has grown consistently since January 2010.

18 It's worth noting that this employment number is simply how much higher employment is at the end of 2010 than would have been the case without ARRA. But, because some of these 3.4 million employees will have had their jobs for over a year, the number of job-years spurred by ARRA is much larger – roughly 50-60% larger. Further, it is also important to note that a significant portion of the new labor demand spurred by the ARRA was absorbed through increasing the hours of incumbent employees. If the metric used is full-time equivalent employees, then the jobs created by the ARRA would be increased by roughly 30% - so the number rises to well over 3 million even by the middle of 2010.

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20 Executive Office of the President, Council of Economic Advisors, 2010. "The Economic Impact of the American Recovery and Reinvestment Act of 2009, Fourth Quarterly Report."

21 U.S. Energy Information Administration. "Use of Energy in the United States Explained." http://tonto.eia.doe.gov/energyexplained/index.cfm?page=us_energy_use

22 U.S. Department of Energy (DOE), Office of Inspector General (OIG), Office of Audit Services (OAS), 2010. "Progress in Implementing the Department of Energy's Weatherization Assistance Program Under the American Recovery and Reinvestment Act."

23 U.S. Department of Energy, Energy Efficiency and Renewable Energy (EERE), 2009. "Weatherization Assistance Program – The American Recovery and Reinvestment Act of 2009." http://www1.eere.energy.gov/wip/pdfs/wx_recovery_fact_sheet.pdf

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25 Email communication from Terrie D'Antonio, HELP of Southern Nevada, January 18, 2011.

26 Email communication from Jaime Carlson, DOE, February 2 and 15, 2011.

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28 Email communication from Joe Taylor, Local 872, February 8, 2011.

29 Email communication from Jaime Carlson, DOE, February 2, 2011. All job creation information is generated from recipient-report job numbers in FederalReporting.gov (FR.gov). Unfortunately, the guidance established for defining job creation in FR.gov, agreed to by both the Recovery Act Transparency Board and Congress, does not differentiate between a job "created" and "saved" and only requires quarterly (not cumulative) job data. The logic here was that any job "saved," is by definition a job "created," in that a job was created for someone who would otherwise lose his/her job. DOE Recovery Act recipients reported over 43,000 full-time equivalent (FTE) jobs created and/or saved between October and December 2010. Since DOE cannot differentiate between jobs "created" and "saved" there is no way to calculate cumulative job figures by adding together quarters. This methodology would result in double counting of job figures. DOE did discuss with OMB the option of DOE collecting cumulative job figures from recipients independent of FR.gov. However, approval was not granted for fear of adding cumbersome reporting requirements on recipients.

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31 U.S. Department of Energy, Energy Efficiency and Renewable Energy, Industrial Technologies Program. http://www1.eere.energy.gov/industry/about/pdfs/itp_program_fact_sheet.pdf

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41 Ibid

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43 American Wind Energy Association, BlueGreen Alliance, United Steelworkers Union, 2010. "Winds of Change: A Manufacturing Blueprint for the Wind Industry."

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48 Email communication from Andrea Fisher-Colwill, Department of Treasury, January 31, 2011.

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52 U.S. Solar Energy Trade Assessment, 2010.

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58 EPA Inspector General, 2010. "EPA Action Needed to Ensure Drinking Water State Revolving Fund Projects Meet the American Recovery and Reinvestment Act Deadline of February 17, 2010." http://www.epa.gov/oig/reports/2010/20091217-10-R-0049.pdf

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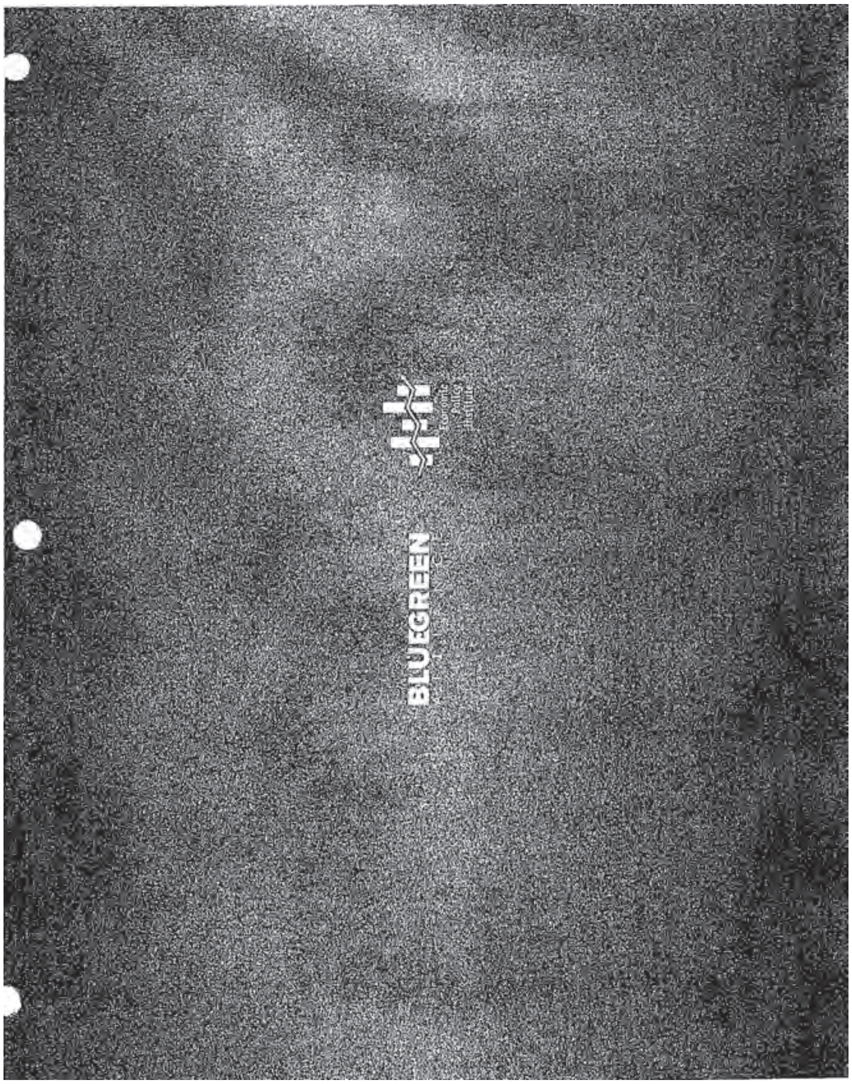
70 This shortfall of 11 million jobs includes both the 7.8 million jobs lost between December 2007 and January 2011 as well as the 3.6 million jobs that would have needed to have been created since the recession's beginning to absorb new labor market entrants without putting upward pressure on the unemployment rate.

71 For example, the Congressional Budget Office (CBO) in its recent Budget and Economic Outlook: Fiscal Years 2011 through 2021, forecast that the full-employment in the labor market will not occur before 2016.

72. Zandi, Mark 2010. "U.S. Macro Outlook: Compromise Boosts Stimulus," Moody's Economy.com, December 8. http://www.economy.com/sf/viewEmailArticle.asp?sId=04326D87-2F7C-487D-A7FC-6890BCF47967&g=0705A94C10AC4353B8866070BFC8999A

73 Congressional Budget Office, 2010. "Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output From July 2010 Through September 2010," Washington, D.C. November 2010. pg. 6, Table 2. http://www.cbo.gov/ftpdocs/119xx/doc11975/11-24-ARRA.pdf

74 Pollack, Ethan 2010. "The job impact of transportation reauthorization," Economic Policy Institute, Washington, D.C. June 24, 2010. pg.6. http://www.epi.org/publications/entry/the_job_impact_of_transportation_reauthorization/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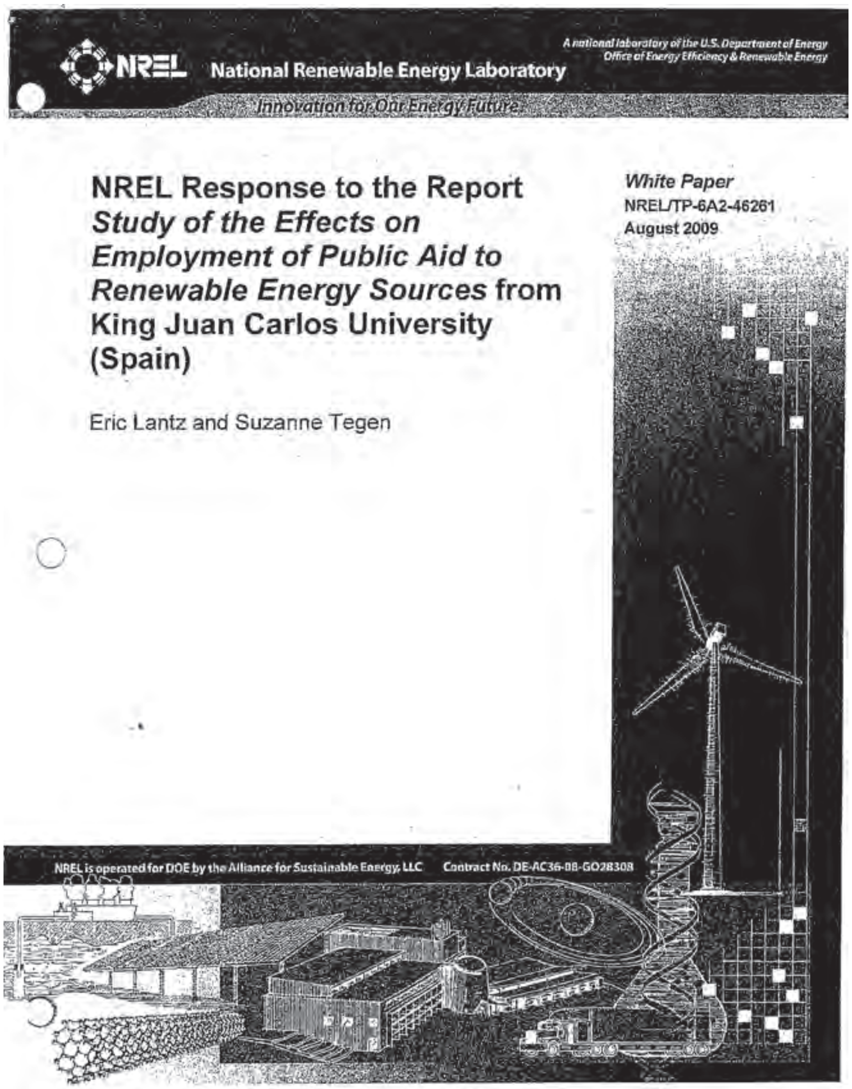

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Innovation for Our Energy Future

NREL Response to the Report *Study of the Effects on Employment of Public Aid to Renewable Energy Sources* from King Juan Carlos University (Spain)

White Paper
NREL/TP-6A2-46261
August 2009

Eric Lantz and Suzanne Tegen

NREL is operated for DOE by the Alliance for Sustainable Energy, LLC   Contract No. DE-AC36-08-GO28308

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Prepared under Task No. SAO9.2011

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Background

Job generation has been a part of the national dialogue surrounding energy policy and renewable energy (RE) for many years. RE advocates tout the ability of renewable energy to support new job opportunities in rural locations and the manufacturing sector. Others argue that spending on renewable energy is an inefficient allocation of resources and can result in job losses in the broader economy.

The report *Study of the Effects on Employment of Public Aid to Renewable Energy Sources,* from King Juan Carlos University in Spain, is one recent addition to this debate. The report asserts that, on average, every renewable energy job in Spain "destroyed" 2.2 jobs in the broader Spanish economy. The authors also apply this ratio in the U.S. context to estimate expected job loss from renewable energy development and policy in the United States (Alvarez et al. 2009).

The analysis by the authors from King Juan Carlos University represents a significant divergence from traditional methodologies used to estimate employment impacts from renewable energy. In fact, the methodology does not reflect an employment impact analysis. Accordingly, the primary conclusion made by the authors – policy support of renewable energy results in net jobs losses – is not supported by their work.

This white paper discusses fundamental and technical limitations of the analysis conducted by King Juan Carlos University and notes critical shortcomings in assumptions implicit in the conclusions. The white paper also includes a review of traditional employment impact analyses that rely on accepted, peer-reviewed methodologies, and it highlights specific variables that can significantly influence the results of employment impact analysis.

Summary of King Juan Carlos University Methodology

The authors of the King Juan Carlos study intend to relate the economic efficiency of renewable energy jobs to those of the broader economy. To do this, they compare the government expenditure per estimated RE job with the average private-sector resources expended per worker and the average productivity per worker. Their quantitative approach is shown below.

Calculation A:

$$\frac{Subsidy\ to\ renewables\ per\ worker}{Average\ capital\ per\ worker}$$

Calculation B:

$$\frac{Annual\ subsidy\ to\ renewables\ per\ worker}{Average\ productivity\ per\ worker}$$

The Spanish report asserts that the results derived from the ratios above represent job loss as a result of public investment in renewable energy. This is based on the assumed principle that every dollar spent subsidizing renewables represents a reduction of one dollar in private-sector investment *and* that every dollar spent in the private sector will generate jobs equally.

In contrast, traditional jobs analyses evaluate how changes in demand for specific goods and services will affect economic activity and jobs within specific industries, their supply chain, and the broader economy. The input-output tables applied in traditional analyses are derived from real inter-industry transactions at a specific time. The most sophisticated analyses account for a reduction in demand where substitutions occur (e.g., reduced demand for conventional electricity generation due to new renewable generation), as well as the effects of government expenditures and changes in commodity prices (e.g., electricity).

Fundamental Limitations

- **The metrics used in the Spanish study are not jobs impact estimates.** The primary conclusion of the report is that the Spanish economy has experienced job loss as a result of its RE installations. However, comparing the RE subsidy per job with the Spanish economy's average capital per job and average productivity per job is not a measure of job loss. Traditional methods for estimating jobs and economic impacts are discussed below.

- **The comparison of RE jobs with average economy-wide metrics fails to recognize the variability within the modern economy.** The cost of job creation varies significantly among economic sectors. For example, creating employment for legal or medical professionals costs more than creating employment for clerical or administrative professionals. Applying a methodology that compares renewable energy employment with an economy-wide average explains very little about how RE job creation compares with comparable industries. A more informative analysis would compare metrics relating to RE workers with metrics for workers in other electricity generating industries. It would also show the range of metrics that exist across industries rather than economy-wide averages.[1]

- **The report fails to account for technology export potential.** Robust RE technology exports can greatly affect economic impacts of renewable energy (Lehr et. al. 2008). With its proactive RE policies, Spain is already a major exporter of renewable energy equipment (David 2009).[2] If global demand for RE technology increases, Spain's early investment could allow it to capitalize on a global market for RE technology, which would contribute further to the Spanish economy.

- **The study ignores the role of government in facilitating growth of valued new industries.** Governments invest in renewable energy technologies to promote the growth of the industry as a whole. Emerging RE technologies have not achieved levels of maturity and economics of scale that traditional technologies have; nor have they benefited from years of public and private investment. As a result, there may be a role for government to play in leveling the playing field between new and old technologies and in supporting emerging technologies. In the United States, all conventional energy technologies received government support in their early stages, and still benefit from government investment today (EIA 2008).

Technical Limitations

- **The calculation of average capital and average productivity per worker is based on jobs resulting from economic activity at all levels (i.e., it includes direct, indirect, and induced jobs).**

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[1] These results could simply suggest that RE jobs require more highly trained – and, therefore, more costly – workers than the Spanish economy, in general. Moreover, the deviation from the economy-wide average capital and productivity per worker observed for renewables may be well within the statistical norms of a diverse and robust modern economy.

[2] Spain was the second-largest supplier of U.S. wind turbine generator imports in 2007 and 2008, and its overall exports of wind-powered generator sets reached $469.7 million in 2008 (David 2009).

However, the RE jobs estimate used to calculate the RE subsidy per job is based on a quantification of direct and indirect impacts only. The RE employment data used in this analysis is based on analysis of the direct and indirect job impacts from investment in renewable energy (MITRE 2003). Yet the average capital per worker and average productivity per worker are based on employment estimates that include jobs resulting from direct, indirect, and induced economic activity. A more complete comparison would include induced jobs impacts in the total RE jobs estimate that is used to estimate the average RE subsidy per worker.[3]

- **The report relies on jobs estimates that were developed in 2003 and do not reflect Spain's RE industries in 2009.** The total RE job creation estimate used by the authors was derived from two hypothetical Spanish deployment scenarios conducted in 2003 (MITRE 2003). However, neither of these projections reflects the actual deployment of renewable energy capacity in Spain. The authors imply that these results are a valid approximation. This approach ignores the discrepancies between assumptions that were reasonable in 2003 and the empirical reality that exists today.

- **The report lacks transparency and supporting statistics.** It is striking that the authors' calculations with two very different economic metrics generate the same result. The authors claim this increases their confidence in their result. However, because there is no statistical analysis, it does not seem reasonable to draw conclusions regarding confidence in either result. The authors also fail to justify their chosen methodology or cite others who have applied a similar methodology.

Shortcomings in Assumptions

- **The authors assume that a dollar spent by the government is less efficient than a dollar spent by private industry and that it crowds out private investment.** Government spending may be more or less efficient than private investment. To the extent that government spending is a correction for market failures (e.g., existing fossil fuel subsidies, environmental externalities), it is less likely to represent an inefficient allocation of resources. Furthermore, there is no justification given for the assumption that government spending (e.g., tax credits or subsidies) would force out private investment. This assumption is fundamental to the conclusion that Spain's renewable energy policy has resulted in job loss.[4]

  Even if every public dollar spent on renewables does result in fewer jobs than the average dollar spent in the Spanish economy, public investment in renewables will only result in overall job loss when: there is full employment, all private-sector funds are spent on job-generating activity (i.e., not on shareholder dividends or paying down debt), and there is no positive benefit for the society from renewable energy in general. Without each of these conditions holding true, one cannot claim that public investment has resulted in job loss, regardless of the efficiency of the public investment.

- **The authors assume that results from Spain are reflective of the impact of RE technologies in other countries.** Countries have different regulations, policies, and incentives for renewable energy,

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[3] Direct and indirect impacts include the impacts from expenditures in the industry of focus, as well as the various industries that supply the industry that is the subject of the analysis. Induced economic activity results from spending income generated through the original investments at the direct and indirect levels. A full social accounting matrix of economic activity includes all three levels of economic activity.

[4] Government spending may result in reallocation of resources.

Minor policy differences can have great impacts on outcomes. Applying a single result derived from a specific set of market and policy conditions to renewable energy, in general, is a distortion of real differences in global market and policy conditions. For example, Spanish feed-in tariff (FIT) policies require utilities to purchase all electricity generated by RE resources at a price that is often much greater than the wholesale prices paid to conventional generators. This policy differs greatly from U.S. incentives such as the production tax credit (PTC).

- **The report relies on jobs as the sole metric to assess the value of renewable energy.** The number of jobs resulting from an impact analysis is an important metric. However, it is not the only value of interest. An analysis of relative costs per job within a specific industry or economy fails to account for the array of costs and benefits that are associated with any investment alternative. For example, Spain relies on natural gas and coal for roughly 52% of its electricity production (IEA 2006). Decreasing that dependence has a number of important energy and economic security implications (NREL et. al. 2008).

In summary, the analysis performed in this recent study is not a jobs impact estimate and, therefore, provides little insight into job creation or job loss from Spanish RE policy. Additionally, this analysis has oversimplifications and assumptions that lead to questions regarding its quantitative results. Finally, the authors fail to justify their implication that because of the jobs comparison, subsidies for renewables are not worthwhile. This ignores an array of benefits besides employment creation that flow from government investment in renewable energy technologies.

Nevertheless, the authors' basic question regarding whether investment in RE provides a positive or negative employment impact is a fair one. The following portion of this white paper briefly reviews additional literature that considers this question.

Traditional Employment Impacts Analysis

Traditional methods applied in jobs and economic impacts analyses rely on input-output models to estimate job creation or loss. These models measure how changes in demand for specific goods and services affect economic activity and jobs within the specific area of study. At the most basic level, jobs analyses rely on a straightforward estimate of gross economic impacts from new investments in specific energy technologies under different scenarios. Such efforts in the United States suggest that, in some cases, the project-level job creation impacts of wind power are greater than that of conventional energy generation resources, including coal and natural gas (Tegen 2006, Lantz and Tegen 2008).

More sophisticated models allow for estimates of net jobs impacts. These models account for a reduction in demand for conventional generation, the effects of government expenditures on RE in the economy, and electricity price impacts.[5] The results of analyses applying these more sophisticated models are mixed; however, with today's cost projections, RE technology jobs and impacts generally have been shown to be greater than business-as-usual scenarios. Some examples follow.

The Monitoring and Modeling Initiative on the Targets of Renewable Energy (MITRE) determined that across Europe, as well as in Spain, renewable energy development would have a net positive impact on employment (MITRE 2003).[6] Work focused on Germany, conducted in 2005, found that feed-in tariff (FIT) policies in their country would result in a surge in employment between 2004 and 2008 as deployment proceeded rapidly; but net employment would turn negative in 2010 as construction of new facilities declined and the higher costs of renewable energy impacted the broader economy (Hillebrand et al. 2006). More recent work finds that, in Germany, net employment remains positive for all renewables deployment scenarios across a variety of sensitivities, and growing export markets greatly increase the net employment impact (Lehr et al. 2008).[7] Finally, an April 2009 study conducted on behalf of the European Commission's Directorate-General Energy and Transport shows "[p]olicies that support renewable energy sources (RES) give a significant boost to the economy and the number of jobs in the EU. Improving current policies so that the target of 20% RES in final energy consumption in 2020 can be achieved will provide a net effect of about 410,000 additional jobs and 0.24% additional gross domestic product (GDP)" (Ragwitz et al. 2009).

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[5] Such models typically use a combination of input-output and macroeconomic modeling capabilities.

In general, comprehensive analyses show that net employment impacts are sensitive to assumptions regarding future energy prices, strategies for addressing greenhouse gas (GHG) emissions reductions, and the capacity to export technology. With increased awareness of potential energy price scenarios, recent research has found that it is only when conventional energy prices are forecast to be very low that net employment impacts from RE investments are negative.[8]

Conclusions

The recent report from King Juan Carlos University deviates from the traditional research methodologies used to estimate jobs impacts. In addition, it lacks transparency and supporting statistics, and fails to compare RE technologies with comparable energy industry metrics. It also fails to account for important issues such as the role of government in emerging markets, the success of RE exports in Spain, and the fact that induced economic impacts can be attributed to RE deployment. Finally, differences in policy are significant enough that the results of analysis conducted in the Spanish context are not likely to be indicative of workforce impacts in the United States or other countries.

Energy policy has always been a politically charged subject. And in today's economy, where job creation is at a premium, questions pertaining to the impact of energy policy on employment magnify the sensitive nature of this debate. Measuring long-term economic and employment impacts is a complex task, sensitive to an array of unknowns, including future prices for both conventional fuel and renewable energy. Because this work is highly sensitive to assumptions and the quality of research, it is critical that policy makers seriously evaluate the work presented to them; and even after careful scrutiny, place jobs estimates within the broader context of energy, the economy, the environment, and the future.

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[6] Remarkably, this is the same resource that the King Juan Carlos University authors use to argue that the Spanish economy is losing jobs as a result of its policies promoting renewable energy.

[7] Even with conservative assumptions relative to today's prices – where renewable energy is not expected to be wholly cost-competitive until 2020 (at oil prices of $60 per barrel in 2020 and CO_2 at €15 per ton) – there is a net positive impact that is further boosted by technology exports. It is only in the most extreme scenarios with very low energy prices ($30 per barrel oil in 2020) and no exports of RE equipment, that the net employment impact of Germany's feed-in tariff policies is negative (Lehr et al. 2008).

[8] In most recent analysis, electricity-price increases from renewable energy deployment are minimal. The U.S. Energy Information Administration's analysis of two scenarios with a national 25% renewable energy standard (RES) showed that national electricity prices are impacted by less than 1% by 2030 (EIA 2009). A similar NREL report showed that of the RES proposals analyzed, no state experiences electricity price increases of more than 5%, and most states actually experience electricity price decreases rather than increases (Sullivan et al. 2009).

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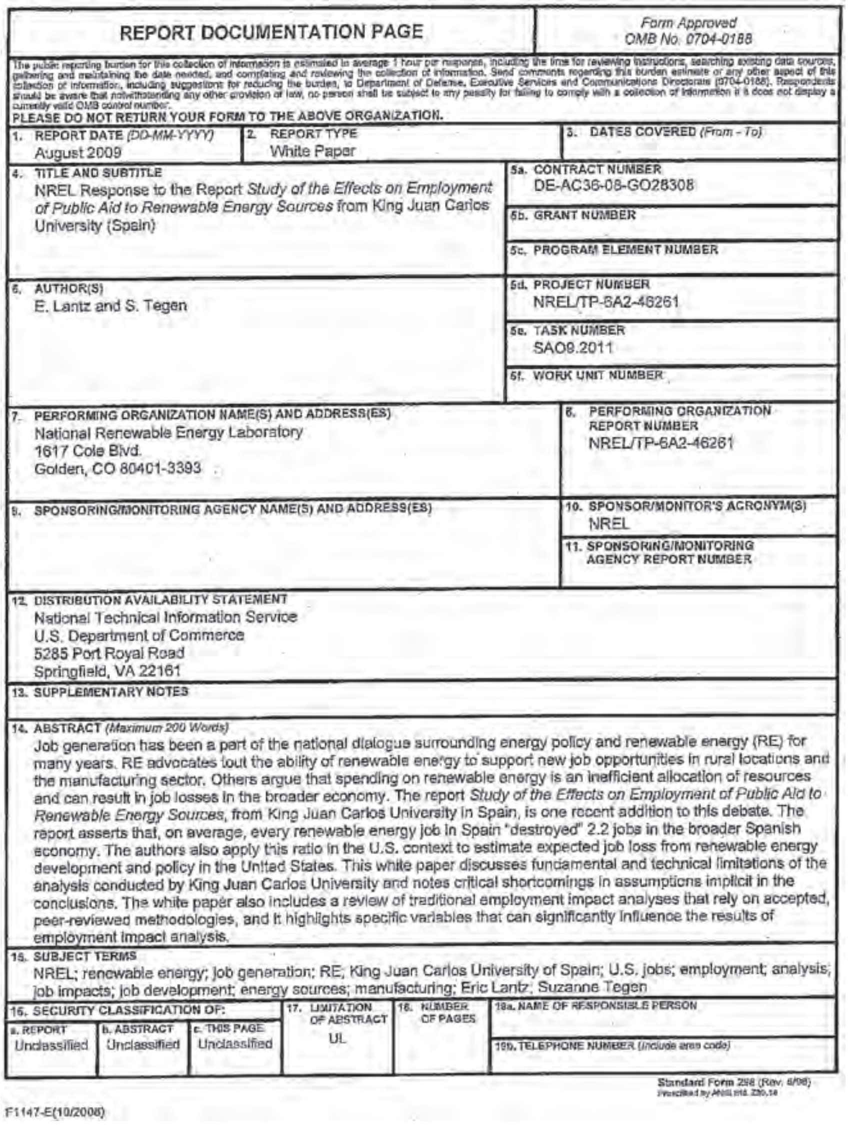

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3. DATES COVERED *(From - To)*:
4. TITLE AND SUBTITLE: NREL Response to the Report *Study of the Effects on Employment of Public Aid to Renewable Energy Sources* from King Juan Carlos University (Spain)

5a. CONTRACT NUMBER: DE-AC36-08-GO28308
5b. GRANT NUMBER:
5c. PROGRAM ELEMENT NUMBER:
6. AUTHOR(S): E. Lantz and S. Tegen

5d. PROJECT NUMBER: NREL/TP-6A2-46261
5e. TASK NUMBER: SAO9.2011
5f. WORK UNIT NUMBER:

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401-3393

8. PERFORMING ORGANIZATION REPORT NUMBER: NREL/TP-6A2-46261
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES):
10. SPONSOR/MONITOR'S ACRONYM(S): NREL
11. SPONSORING/MONITORING AGENCY REPORT NUMBER:

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13. SUPPLEMENTARY NOTES

14. ABSTRACT *(Maximum 200 Words)*

Job generation has been a part of the national dialogue surrounding energy policy and renewable energy (RE) for many years. RE advocates tout the ability of renewable energy to support new job opportunities in rural locations and the manufacturing sector. Others argue that spending on renewable energy is an inefficient allocation of resources and can result in job losses in the broader economy. The report *Study of the Effects on Employment of Public Aid to Renewable Energy Sources*, from King Juan Carlos University in Spain, is one recent addition to this debate. The report asserts that, on average, every renewable energy job in Spain "destroyed" 2.2 jobs in the broader Spanish economy. The authors also apply this ratio in the U.S. context to estimate expected job loss from renewable energy development and policy in the United States. This white paper discusses fundamental and technical limitations of the analysis conducted by King Juan Carlos University and notes critical shortcomings in assumptions implicit in the conclusions. The white paper also includes a review of traditional employment impact analyses that rely on accepted, peer-reviewed methodologies, and it highlights specific variables that can significantly influence the results of employment impact analysis.

15. SUBJECT TERMS
NREL; renewable energy; job generation; RE; King Juan Carlos University of Spain; U.S. jobs; employment; analysis; job impacts; job development; energy sources; manufacturing; Eric Lantz; Suzanne Tegen

16. SECURITY CLASSIFICATION OF: a. REPORT	b. ABSTRACT	c. THIS PAGE	17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
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F1147-E(10/2008)

Chairman BROUN. Anything else? Okay. Witnesses excused. The hearing is now adjourned, and thank you all very much.

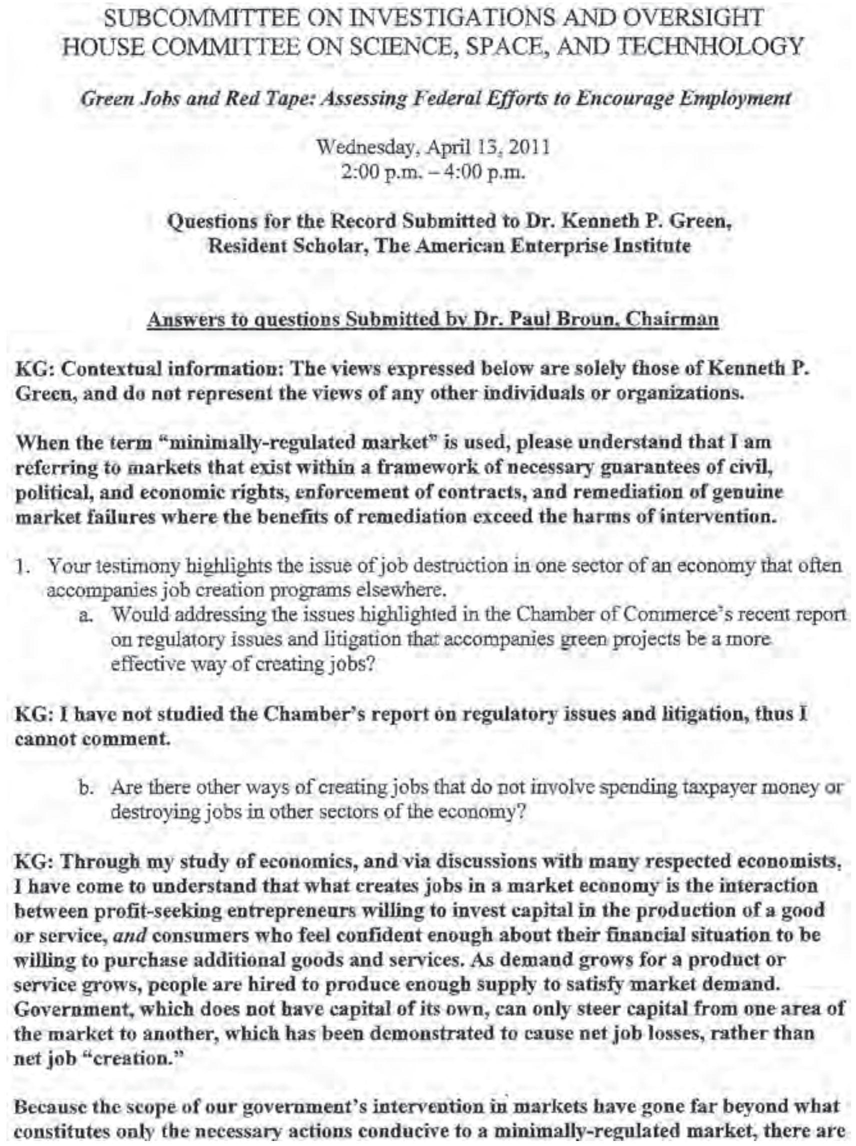
[Whereupon, at 4:05 p.m., the Subcommittee was adjourned.]

Appendix

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by Dr. Kenneth Green, Resident Scholar at the American Enterprise Institute



SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNHOLOGY

Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment

Wednesday, April 13, 2011
2:00 p.m. – 4:00 p.m.

Questions for the Record Submitted to Dr. Kenneth P. Green,
Resident Scholar, The American Enterprise Institute

Answers to questions Submitted by Dr. Paul Broun, Chairman

KG: Contextual information: The views expressed below are solely those of Kenneth P. Green, and do not represent the views of any other individuals or organizations.

When the term "minimally-regulated market" is used, please understand that I am referring to markets that exist within a framework of necessary guarantees of civil, political, and economic rights, enforcement of contracts, and remediation of genuine market failures where the benefits of remediation exceed the harms of intervention.

1. Your testimony highlights the issue of job destruction in one sector of an economy that often accompanies job creation programs elsewhere.
    a. Would addressing the issues highlighted in the Chamber of Commerce's recent report on regulatory issues and litigation that accompanies green projects be a more effective way of creating jobs?

KG: I have not studied the Chamber's report on regulatory issues and litigation, thus I cannot comment.

    b. Are there other ways of creating jobs that do not involve spending taxpayer money or destroying jobs in other sectors of the economy?

KG: Through my study of economics, and via discussions with many respected economists, I have come to understand that what creates jobs in a market economy is the interaction between profit-seeking entrepreneurs willing to invest capital in the production of a good or service, *and* consumers who feel confident enough about their financial situation to be willing to purchase additional goods and services. As demand grows for a product or service grows, people are hired to produce enough supply to satisfy market demand. Government, which does not have capital of its own, can only steer capital from one area of the market to another, which has been demonstrated to cause net job losses, rather than net job "creation."

Because the scope of our government's intervention in markets have gone far beyond what constitutes only the necessary actions conducive to a minimally-regulated market, there are

many areas of the economy that might expand were government to lighten up on the "choke" of excessive interventions. Thus, they could reduce the "throttling" effect that comes with governmental over-reach, such as excessive, and inefficiently designed regulations that needlessly impose economic harm on the economy. They could also reduce economic throttling by revising the tax code so that consumption is taxed, while productivity and savings are not. Finally, at the macro level, government action that addresses the nation's fiscal problems and hence promote consumer confidence could allow markets to flourish, creating economic productivity and jobs.

2. Has Europe continued providing subsidies for green energy?

KG: Europe has been a leader in subsidizing green energy, but in recent years, they are finding such subsidies both harmful to their economy, and fiscally unsustainable. Studies of the European experience with green-energy subsidies show a pattern of elevated prices for electricity, net job losses, industrial flight, rent-seeking, and outright corruption.

3. American stimulus funds have been used to purchase wind turbines manufactured in Europe and China. In contrast to job destruction in Europe caused by their environmental regulations, do you have any estimates on how many European jobs have been created due to American stimulus funding?

KG: Because relatively little of the stimulus money allocated for green energy has actually been spent, and because governments are not terribly forthcoming with the kind of information needed to document foreign job creation stemming from U.S. stimulus funding, I cannot offer an estimate on how many European jobs have been created with U.S. funds. However, reports in the media and by government agencies suggest that a significant share (in some cases the majority of project spending) has gone to foreign companies in Europe and Asia.

4. Do you believe stimulus funding is contributing to the hollowing out of our nation's manufacturing base by importing key alternative energy technologies such as wind turbines?

KG: As we didn't start with a terribly large alternative energy sector, I would be hesitant to blame the stimulus for "hollowing out" a significant amount of manufacturing in that sector. In a normal minimally-regulated market situation, I would say that the "best" use of capital would be to buy what we need as inexpensively as possible, regardless of national origin, so long as our source was complying with international trade regimes. But because we are talking about money taken from taxpayers by government fiat, and allocated without regard to their choices by bureaucrats and regulators, an argument can be made that if the money *had* to be spent, it would have benefited American taxpayers more if it were spent here, rather than used to import foreign goods to the profit of foreign manufacturers and foreign laborers.

5. As this Subcommittee has investigations and oversight responsibilities, have you seen any similar examples of corruption in the green area similar to what you discovered in Europe?

KG: I am unaware of any outright corruption in the green sector here in the United States. This could be due to the relatively recent entry of the U.S. into the green energy 'race;' it could be due to the mainstream media's clear support of the green-energy agenda; or it could simply be due to the opacity of the overall effort to stimulate a new "green economy" here in the United States.

6. Are there parts of the federal investment in the green economy that you would recommend we pay more attention to than others due to the greater possibility of corruption or malfeasance?

KG: While this is outside my area of expertise, I would be wary of spending U.S. funds in jurisdictions where property rights are poorly defined, the rule of law is weak, transparency is limited, and where the potential for corruption is correspondingly high. This would include various countries in Europe and Asia, where we have already seen evidence of such corruption in the green sector. Domestically, I would be wary of no-bid grants and contracts, or grants for *applied* Research and Development, which can often be based on little more than "vaporware." While exaggerating the market-readiness of a proposed technology might not count as outright corruption, I would have to say it's on the margin.

7. The Administration has made a very high profile effort to invest a significant amount of taxpayer money in job creation focused on green jobs.
    a. How should Congress evaluate various job creation proposals?

KG: "Job creation" should be evaluated on a "net jobs" basis. That is, the amount of money spent to "create" a job in "endeavor A" should be evaluated on the basis of how many comparable jobs that same amount of capital would create if invested in the overall economy. Better still, one should compare the spending to "create" jobs against how much a comparable job costs in minimally-regulated parts of the economy. Any "job-creation" proposal that cannot be shown to create jobs on net should be rejected out of hand. Any "job-creation" proposal that relies on up-front and continuing taxpayer subsidization should be considered dubious, and would best be avoided. Any "job-creation" proposal that relies on numerous assumptions about consumer behavior that are at odds with established estimates in respected literature should be considered high-risk proposals, and studied with great care.

    b. What is an appropriate cost, if any, for American taxpayers to pay to create a single job? Is it $100,000; $1,000,000; $10,000,000; etc…?

KG: Just as minimally-regulated markets reveal the amount that a consumer is willing to pay for a good or service, only similar markets in labor costs can reveal what the "appropriate" cost of a job should be. What matters is comparability: thus, if the government wants to know what the appropriate cost is to pay a government-employed fire-fighter, they should base that determination on the comparability of the job, and the total compensation of a fire-fighter in the private sector. The problem with this is that there are many factors that go into "comparability" which are impossible to define broadly,

including regional cost-of-living issues, regional risk variations, seniority/experience issues, individual productivity issues, etc. The "knowledge" of what the right salary is for a given job is diffuse, and not held by any one group in the economy. Rather, compensation emerges from the interactions of individuals trading in labor in a minimally-regulated market.

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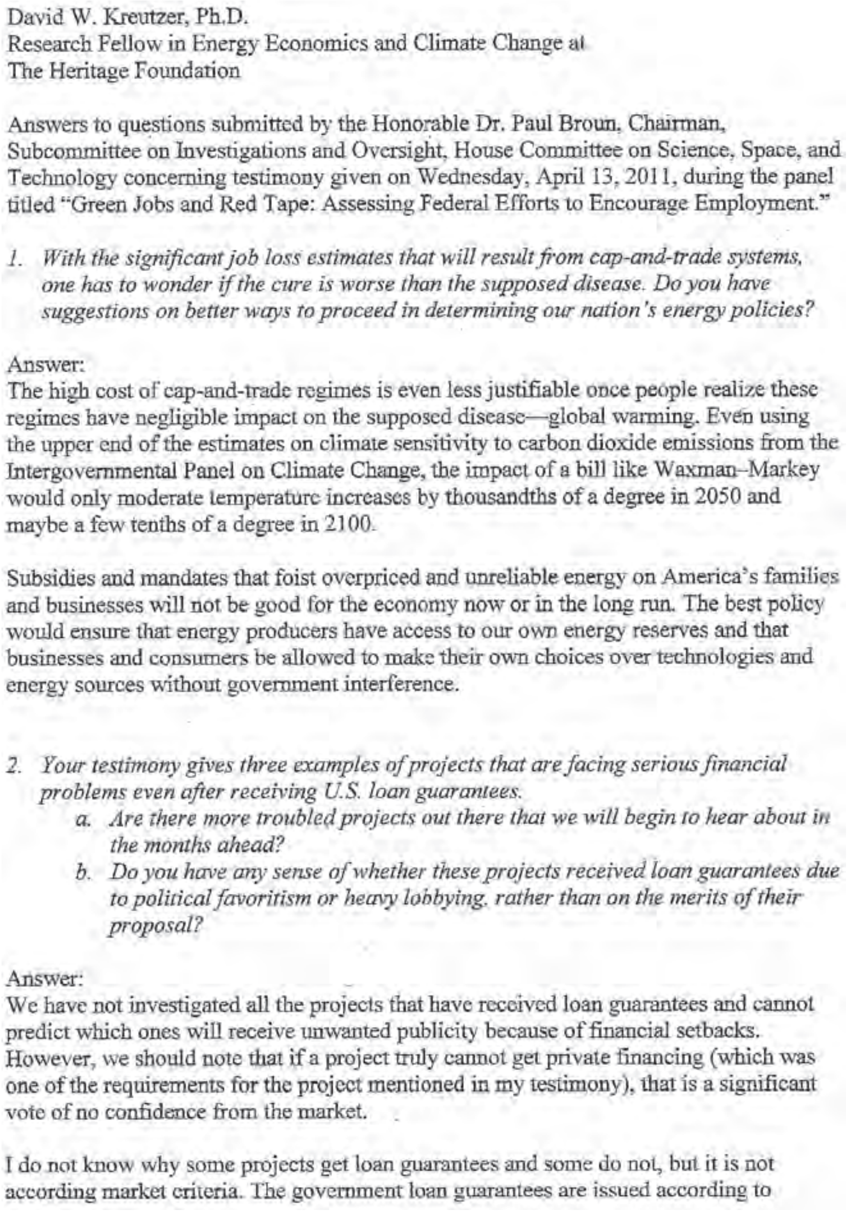
Responses by Dr. David Kreutzer, Research Fellow in Energy, Economics, and Climate Change, The Heritage Foundation



David W. Kreutzer, Ph.D.
Research Fellow in Energy Economics and Climate Change at
The Heritage Foundation

Answers to questions submitted by the Honorable Dr. Paul Broun, Chairman, Subcommittee on Investigations and Oversight, House Committee on Science, Space, and Technology concerning testimony given on Wednesday, April 13, 2011, during the panel titled "Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment."

1. *With the significant job loss estimates that will result from cap-and-trade systems, one has to wonder if the cure is worse than the supposed disease. Do you have suggestions on better ways to proceed in determining our nation's energy policies?*

Answer:
The high cost of cap-and-trade regimes is even less justifiable once people realize these regimes have negligible impact on the supposed disease—global warming. Even using the upper end of the estimates on climate sensitivity to carbon dioxide emissions from the Intergovernmental Panel on Climate Change, the impact of a bill like Waxman–Markey would only moderate temperature increases by thousandths of a degree in 2050 and maybe a few tenths of a degree in 2100.

Subsidies and mandates that foist overpriced and unreliable energy on America's families and businesses will not be good for the economy now or in the long run. The best policy would ensure that energy producers have access to our own energy reserves and that businesses and consumers be allowed to make their own choices over technologies and energy sources without government interference.

2. *Your testimony gives three examples of projects that are facing serious financial problems even after receiving U.S. loan guarantees.*
    a. *Are there more troubled projects out there that we will begin to hear about in the months ahead?*
    b. *Do you have any sense of whether these projects received loan guarantees due to political favoritism or heavy lobbying, rather than on the merits of their proposal?*

Answer:
We have not investigated all the projects that have received loan guarantees and cannot predict which ones will receive unwanted publicity because of financial setbacks. However, we should note that if a project truly cannot get private financing (which was one of the requirements for the project mentioned in my testimony), that is a significant vote of no confidence from the market.

I do not know why some projects get loan guarantees and some do not, but it is not according market criteria. The government loan guarantees are issued according to bureaucratic implementation of federal legislation, which is subject to different influences and disciplines than loans made in private markets.

3. *The Administration has made a very high-profile effort to invest a significant amount of taxpayer money in job creation focused on green jobs.*
    a. *How should Congress evaluate various job creation proposals?*
    b. *What is an appropriate cost, if any, for American taxpayers to pay to create a single job? Is it $100,000; $1,000,000; $10,000,000; etc...?*

Answer:
All job-creation policies should be viewed very skeptically. Because the resources used to create a job in one area would have been used in other areas of the economy, there will be offsetting job losses. A better approach would be to compare the value produced in one area to the value lost elsewhere.

It is not possible to put a number on the reasonable amount for creating a job, for at least two reasons. First, not all jobs generate the same level of output and income. So, we would expect to make a greater investment, both in equipment and human capital, for a surgeon's job than for a suburban teenager's lawn-mowing job. Second, as mentioned above, the jobs created are not likely to be jobs created on net but will be offset by job losses elsewhere.

The cost of government programs should be compared to the direct benefit of the expenditure. The cost or price measures the value of what is lost elsewhere in the economy. For instance, is the additional security provided by another aircraft carrier worth the cost; is the value of the widened highway worth the cost; or does the solar panel provide electricity that is worth more than its cost?

Though the costs and benefits are often difficult to quantify, adding a jobs-created measure only muddies the waters. It would make little sense to enact a program that creates more jobs but reduces the value of economic activity, since this would mean people are working more for less.

So, the appropriate criterion would be whether the value of the program's goods or services exceeds the cost, as well as these values can be estimated.

Responses by Dr. David W. Montgomery, Vice President, NERA Economic Consulting

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNHOLOGY

Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment

Wednesday, April 13, 2011
2:00 p.m. – 4:00 p.m.

Questions for the Record Submitted to Dr. David W. Montgomery, Vice President, NERA Economic Consulting

Questions Submitted by Dr. Paul Broun, Chairman

1. Your testimony highlights the role of Federal Research and Development (R&D). Since this R&D occurs in federally owned labs, federally funded research at universities, and through direct federal R&D grants,
    a. Is there a difference in the type or quality of research produced in these settings?
    b. Do you have a preference for where federally funded R&D funding should occur?

    Answer: I believe there is. Federally-funded university research is highly important. It provides support to independent researchers, thus increasing the likelihood that high-risk research with the potential to lead to breakthroughs in technology will take place. It is also critically important to increase the number of qualified scientists and engineers to undertake energy research without draining resources from other fields. Federal funding of universities is also important to maintain open communication of research results and even lack of progress, which is increasingly threatened by the profit motives of universities that are holding and profiting from intellectual property created by their faculty.

    There is a danger that even university research will be excessively narrowed by managers of federal funding, who want to make sure that their grants are successful and therefore take too few risks. But this danger is much greater with direct grants, which carry out the program designed by the Department of Energy. In both cases it is very important to put this funding off-limits to earmarks, which can reduce the quality of research and distort the direction.

    Both of these types of research have had significant successes and both have produced pedestrian work of low quality; the differences can largely be attributed to the design of the Federal program and the quality and motivation of the DOE R&D managers. Dr. John Houghton, a program manager in the Office of Energy Research, produced high quality research in every field he sponsored, because he was a risk taker, understood the science without trying to direct it excessively, and understood the Federal role. But creating an environment in which new and established researchers can compete on a level playing field and in which peer review is utilized effectively is probably more likely in dealing with university research. Direct grants work when the R&D manager knows exactly what he wants – which is more characteristic of defense than energy R&D. When all we know is that we need the best researchers concentrating on fields that could produce social benefits, funding for universities is probably superior.

I believe that all Federal laboratories should be spun off to the private sector. They are far too vulnerable to earmarking and pork barrel allocation of funds, and are designed to spend far too large a portion of their budgets on developing policy prescriptions and on carrying out demonstration projects in which Federal funding should be minimized.

2. The Administration has made a very high profile effort to invest a significant amount of taxpayer money in job creation focused on green jobs. Are there other federal efforts that could more efficiently help unemployed Americans and stimulate the growth of the green economy?

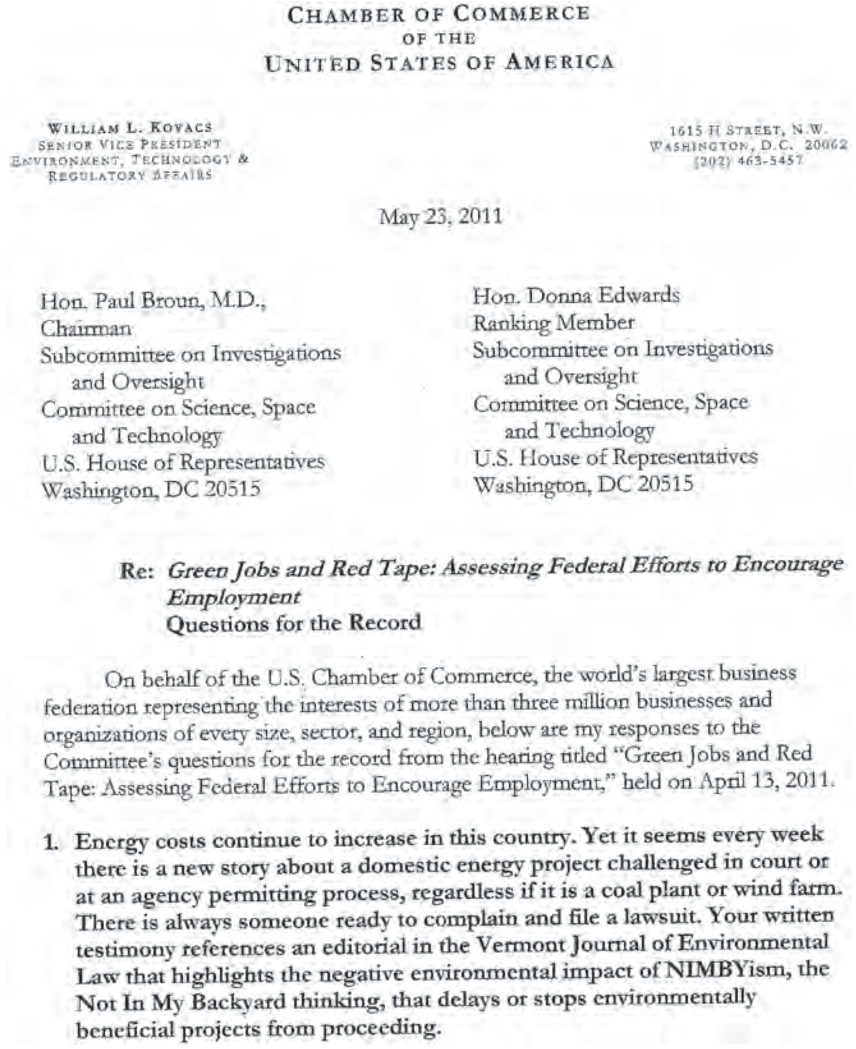
   Answer: There is no way to simultaneously help currently unemployed Americans and provide effective incentives for a long term shift in technology development and shift in the structure of the economy. Creating the technology basis for a lower carbon economy requires starting with funding at the R&D stage to develop the science base from which breakthrough technologies can be developed, and to provide success-oriented incentives like prizes and guaranteed purchase programs for the development of those breakthroughs. Simply subsidizing the deployment of current technologies will not create a green economy, since those technologies are too costly and narrow in application to survive once government support is withdrawn – as it must be if we are to maintain a private enterprise system in this country. And none of these expenditures will happen quickly enough to be of any benefit during the extended recession, since they are for long lead time projects and research. Even with current macroeconomic policies, the recession will be long behind us before a green economy reaches significant size.

   For the currently unemployed, the best policies are macroeconomic and reduction in regulatory burden. These include making tax cuts permanent so that consumers and investors can spend with confidence, terminating unemployment insurance so that the unemployed have an incentive to go back to work, and halting the proliferation of regulations that are reducing the returns on investment and creating uncertainties that hold spending back.

3. What is the appropriate role for the Federal Government related to research and development for energy technologies?

   Answer: The appropriate role for the Federal Government is to support basic and applied research, as it does for all other technologies of national importance, and leave development and deployment to the private sector. To the extent that energy research needs to be shifted into directions that could help achieve environmental goals, that shift should be brought about by choosing fields of basic and applied research with most promise for providing advances in energy technologies – for example, genetic research, nanotechnology and membrane research – and fund them most heavily without specifying particular energy applications. This should be supplemented with rewards for successful innovation like the X-Prize, to motivate many contenders to take risks with their own best ideas in hopes of fame and fortune.

Responses by Mr. William Kovacs, Senior Vice President, Environment, Technology, & Regulatory Affairs, U.S. Chamber of Commerce



CHAMBER OF COMMERCE
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May 23, 2011

Hon. Paul Broun, M.D.,
Chairman
Subcommittee on Investigations
and Oversight
Committee on Science, Space
and Technology
U.S. House of Representatives
Washington, DC 20515

Hon. Donna Edwards
Ranking Member
Subcommittee on Investigations
and Oversight
Committee on Science, Space
and Technology
U.S. House of Representatives
Washington, DC 20515

Re: ***Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment***
Questions for the Record

On behalf of the U.S. Chamber of Commerce, the world's largest business federation representing the interests of more than three million businesses and organizations of every size, sector, and region, below are my responses to the Committee's questions for the record from the hearing titled "Green Jobs and Red Tape: Assessing Federal Efforts to Encourage Employment," held on April 13, 2011.

1. **Energy costs continue to increase in this country. Yet it seems every week there is a new story about a domestic energy project challenged in court or at an agency permitting process, regardless if it is a coal plant or wind farm. There is always someone ready to complain and file a lawsuit. Your written testimony references an editorial in the Vermont Journal of Environmental Law that highlights the negative environmental impact of NIMBYism, the Not In My Backyard thinking, that delays or stops environmentally beneficial projects from proceeding.**

a. **Can you provide any thoughts about ways to ensure that environmental benefits are fully factored into the permit decision making process?**

Response: I would argue the contrary: that the current weighting system used by federal agencies in environmental reviews weighs too heavily on the side of environmental benefits and too weakly on the side of economic benefits. And the problem is getting worse.

Consider what the Council on Environmental Quality (CEQ) is currently doing to redraft the Principles and Guidelines used by the Army Corps of Engineers to carry out water infrastructure projects. Section 2031 of the Water Resources Development Act of 2007 (WRDA) requires that the 1983 Principles and Guidelines be revised to allow the Army Corps of Engineers the flexibility to choose a water resources project alternative that does not provide the absolute maximum net economic development benefits if a reasonable overriding reason exists—for instance, the alternative accomplishes the project purposes while providing greater ecosystem restoration benefits. The reverse is also true: Section 2031 authorizes the Secretary to choose an alternative that does not provide the absolute maximum net ecosystem restoration benefits if the alternative accomplishes the project purposes while providing greater economic benefits. The bottom line is Congress enacted Section 2031 to give balance to the decision making process and provide the Army Corps increased flexibility to carry out its work.

Instead, CEQ has assumed this task and has proposed a laundry list of environmental and social reasons not to complete a project. And it seeks to make this laundry list the "policy of the United States," applicable to all federal water resources implementation studies. If codified, the guidelines would result in precisely the sort of *imbalance* Congress set out to avoid. It would certainly not "maximize sustainable economic development," as mandated by the Congress in Section 2031.

On the overall issue of environmental protection, the structure of current environmental statutes and regulations, literally allows environmental concerns a veto over all economic concerns. Specifically, every major environmental statute contains "citizen suit" provision that allows anyone to challenge any federal activity that is contrary to any statute or federal environmental regulation. Since the 1970's when the environmental laws were passed, the U.S. Environmental Protection Agency has published over 30,000 pages of regulations and since any citizen can sue for an alleged violation of any provision on any of the 30,000 pages, lawsuits have proliferated and have literally stopped robust economic development in the United States. This point is soundly established in my testimony on Project No Project.

A final complicating factor that places environmental concerns over those of economic concerns is the rapidly expanding list environmental and social concerns that are factored into environmental reviews—such as climate change. These new considerations along with 30,000 pages of regulations have distorted the weighting process to such an extent that environmental concerns will almost always outweigh economic concerns in a federal project. This is not only a recipe for a failed project; it is also a recipe for huge job losses.

b. To your knowledge, has the Administration intervened in any way against these NIMBY complaints on behalf of environmentally beneficial projects likes the ones cited in your report?

Response: To my knowledge—which is limited to the research the Chamber performed on Project No Project—the Administration has not intervened in any way against NIMBY complaints that seek to stall environmentally beneficial projects. However, federal agencies are often the defendants in those challenges, and depending on the project, the Administration will sometimes choose to defend. However, its defense of a NEPA challenge against a renewable energy project will often differ from its defense of a permit for an offshore drilling project.

There are instances, however in which the administration could have done a far better job of pushing back against NIMBYism, rather than what appears to be exploiting NIMBYism to further delay a project. Perhaps the best illustration of this point is the Cape Wind project. As we all know Cape Wind is the poster child of a project being delayed. Cape Wind filed it first application for a permit in 2001and the permit was challenged on numerous grounds for a decade. On April 19, 2011 the Department of Interior issued its final approval for the project. Unfortunately three weeks later The Department of Energy put its loan guarantee for the project on hold thereby forcing Cape Wind to find financing in the private market which is making it more difficult to find enough investors to immediately begin construction. This is a perfect example of how the administration assists the NIMBY movement.

2. The Administration has made a very high profile effort to invest a significant amount of taxpayer money in job creation focused on green jobs.

a. How should Congress evaluate various job creation proposals?

Response: Hearings such as this one are an excellent start. However, in addition to the investigation that is already being conducted, I suggest examining the types of projects that were undertaken—i.e., their size and scope—and determining whether the permitting process for some of the largest projects made them unappealing to federal agencies that were given a mandate to complete projects in a short time. As I wrote in my testimony, over 180,000 of the 272,000 Recovery Act projects covered by NEPA received the most expeditious form of compliance treatment possible—a categorical exclusion—and work was able to begin and jobs were created.[1] Moreover, only 830 projects received an environmental impact statement, the longest available process under NEPA.[2] While these circumstances confirm recognition among some policymakers that the permitting process is harming our ability to grow our economy, they also point to a more disturbing fact: that if an agency wants to get a project done quickly, it will only choose the project that qualifies for a categorical exclusion. These will almost always be small projects. For the nation to begin to build large projects that create a large number of jobs, Congress needs to enact permit streamlining legislation.

b. Are there other federal efforts that could more efficiently help unemployed Americans and stimulate the growth of the green economy?

Response: As set forth in my written testimony, I believe a stronger dedication to the federal Energy Savings Performance Contracting (ESPC) program could help create jobs while stimulating growth of the green economy. ESPCs are a critical tool that will enable the Federal government agencies to meet statutorily-mandated energy reduction goals at no upfront cost to taxpayers. If utilized to their full potential, ESPCs can create tens of thousands of full-time jobs.

Another way to stimulate the growth of green jobs would be to enact permit streamlining provisions for green energy projects. As I discussed in my testimony almost 45% of the projects identified in Project No Project were green energy projects that could not get permits in any reasonable amount of time. Permit streamlining has been effective for certain infrastructure projects, e.g. highways and in Stimulus Act for smaller projects with the use of the categorical exemption. Similar type efforts could be applied to green energy projects. As was discovered in Project No Project the challenges to projects were asserted sequentially; meaning that as one challenged failed another challenge would be made. The intent of this approach was to delay a project indefinitely so that the developer would either lose its financing for the project or exceed any time limits imposed as part of the permitting process. In both cases the project would not move forward. To address these tactics Congress could require that all challenges be consolidated and filed within a short period of time, i.e. six-months. This type of procedure allows all who challenge a project permit to retain all existing rights but it would require that all rights be exercised in a reasonable period of time. A process like this is needed if the U. S. is ever to get serious about building significant projects.

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[1] The Eighth Report on the National Environmental Policy Act Status and Progress for American Recovery and Reinvestment Act of 2009 Activities and Projects, *available at* http://ceq.hss.doe.gov/ceq_reports/reports_congress_feb2011.html.

[2] *Id.*

Thank you for the opportunity to testify on this highly important topic. Please do not hesitate to contact me or my staff with any further questions.

Sincerely,

William L. Kovacs

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